Bengal Secretariat Library Copy
To be returned when done with

BENGAL SECRETARIAT LIBRARY

X/144

APPENDIX SERIES.

OF THE

Indian Forester,

REPORTS BY

E. E. FERNANDEZ, Esq.

Consr. of Forests.

PART I

144

$\frac{X}{5-B}$

PART I

FOREST INDUSTRIES.

1. Manufacture of wood-cellulose and wood-pulp.
2. Preparation of tannin extracts.
3. The resin industry in France.
4. The dry distillation of wood with special reference to the manufacture of wood-spirits, wood-vinegar, acetate of soda and acetic acid.
5. Wood-paving of streets.
6. Manufacture of wood matches.
7. Management of forests of the cork oak (*Quercus Suber*) and preparation of cork.

BENGAL SECRETARIAT LIBRARY

I. WOOD-CELLULOSE AND WOOD-PULP.

These two terms are often used synonymously; but it is best to keep them apart, reserving the first for the pure fibrous matter of the wood left after all cementing and impregnating substances, and those contained in the intra and intercellular spaces, have been dissolved out and removed under the action of re-agents; and the other for the mass of almost pulverised, chemically impure fibres obtained by grinding wood into a paste and washing out of this all soluble matters and others that are in a sufficient state of tenuity to pass through the meshes of a fine sieve.

In the case of wood-pulp, as a consequence of the action of grinding, the fibres of the wood are broken up into such short lengths as to be incapable of uniting, by simple interlacing, to form a thin resisting tissue like paper. Hence a certain minimum proportion of the cellulose or other fibrous substance (rag or *esparto* half-stuff) has to be added by the paper manufacturer.

Above this minimum the quantity to be added varies with the quality of paper required. Thus, for the worst kinds of printing paper a mixture of about 15 per cent. is sufficient, while a printing paper of fairly good quality and a writing one of inferior quality are obtained with a mixture of only 20 per cent. On the other hand, if a tough, not easily tearable paper is wanted, cellulose with little or no admixture of the pulp must be used. The loose specimens of paper submitted herewith, and those in Herr Ludwig Trick's interesting pamphlet, illustrate what has just been said.

M. Weibel, the owner of the largest wood-cellulose factory in France, situated at Norvillars, between Belfort and Besançon, spins and weaves the cellulose after subjecting it to a preliminary special treatment, which gives to it the lustre and appearance of worm silk.

EXTRACTION OF WOOD-CELLULOSE.

The problem to solve here is to completely separate from one another the individual fibres of wood and remove from them everything but the cellulose, without tearing or breaking them up or diminishing their elasticity, toughness or tensile strength. Such a result can obviously be accomplished only by chemical means. Hitherto sulphurous acid, in the form of a soluble sulphite or bisulphite, has been found the most effective and convenient re-agent to use. It has no action on cellulose, even at a high temperature and under high pressure. In a closed vessel with wood chips, at a temperature of 108°—110° C., it becomes split up, giving up a part of its oxygen to the lignin, whereby this last is converted into resinous acids, which pass off in solution when the fibres are washed.

Alkaline bases and basic salts also give good results, but they have the disadvantage of acting only at a very high temperature and under a pressure of 2·67 atmospheres, thus creating risk of explosion.

The best woods to use are those which satisfy the following conditions :—

1. They should be soft, but at the same time possess tough, resisting, long, parallel fibres—the finer, the better.
2. They should be as colourless as possible. Those species which have a distinct dark heartwood may of course be employed, provided young stems or branches with little or no heartwood are used.
3. They should not contain too many knots.

It is unnecessary to add that in any case the wood must be perfectly sound, as the least amount of unsoundness means some degree of decay of the cellulose.

The best European wood for the purpose is spruce. Now, as young stems of this species make the best lashing for rafts, and the wood of such stems, when split thin, can be woven into baskets just as easily as split bamboo, it follows that a flexible elastic wood is also one well adapted for paper-making. In Germany no other conifer but spruce is used by the wood-cellulose maker. In the French Vosges, although silver fir is by far the most abundant conifer, it is scarcely ever employed, and yet a strongly resinous wood with a dark heartwood, like Scots' Pine, is used by M. Louis Geisler, owing to the dearness of spruce, which has for the most part to be imported. Near Besançon, however, silver fir is apparently largely employed.

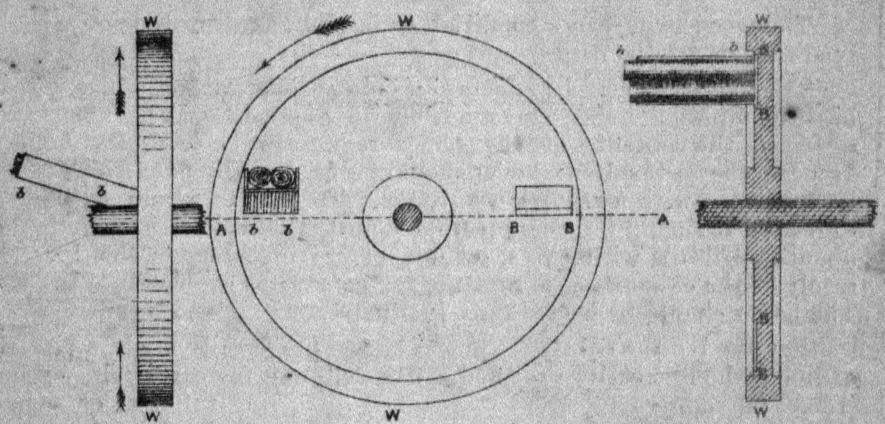
Among broad-leaved species aspen and the white poplar are used in France, both in the Vosges, where there is next to no spruce, and in the Jura, where spruce is abundant. I have been informed that printers are partial to paper containing a certain proportion of aspen and white poplar cellulose, as such paper takes a clearer impression than pure spruce paper. As both these poplars are short-fibred, it would appear that a mixture of short fibre facilitates the printer's work.

I will now describe the process of manufacture.

The wood, which is never less than 3 inches in diameter at the smaller end, is first of all carefully peeled to free it completely of bark. This can be quickly done on a machine consisting of a heavy wheel which is made to revolve rapidly, and is fitted with two sharp blades fixed radially. But hand-peeling is generally preferred, as it wastes much less wood and is also more effective, the machine failing to remove the bark from hollow parts. Barking in the forest is of no use at all, as the wood would have to be shaved again to get rid of mud, dust, grit, etc.

Next, knots and unsound spots are either cut out with an axe, the blade of which narrows and becomes convex towards the cutting edge, or, better still, gouged out with a hand or machine drill.

The wood is then cut up into little pieces small enough to be acted upon, through its entire substance, by the lye in which it is to be digested. This mincing up is effected in France with a machine called a *déchiqueteur*.* WW is a large solid iron wheel about 10 feet in diameter and weighted, like a fly wheel, at its circumference, in order to secure a very high momentum. BB and BB are two sharp, extremely strong



Elevation from side A. *Front elevation.* *Section on A A seen from above.*

blades fixed near the opposite ends of a diameter along one edge of a rectangular opening in the disc of the wheel, the opening being wide enough to allow the billets to be chopped up to pass easily through. These billets (one at a time if thick, two if thin enough) are placed on a sloping sheet-iron bed (bb) and of their own weight slide down against the wheel. The bed rests on an extremely strong solid support, which is not shown above in order not to confuse the sketch. Nor is the floor, which is about 18 inches below the axle of the wheel, represented. The wheel is made to revolve in the direction of the arrow with great velocity. The moment the billets slide forward into one of the openings in

* I believe the English name is defibrator.

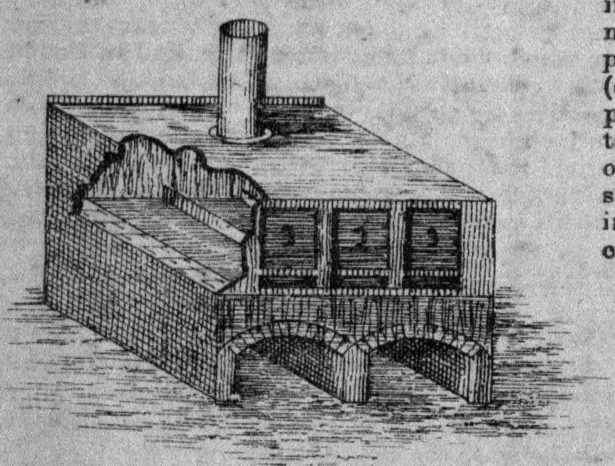
the wheel, the knife catches them before they can slip forward much more than half an inch, and takes off a slice which, owing to the heavy impact and consequent shock, breaks up into numerous chips. The chips fall out, on the other side of the wheel, on to a wooden shoot, down which they slide into an open sac placed at the lower end on the floor below.

The chopping up of the wood is effected with astonishing rapidity with the *déchiqueteur*; but the wood may be reduced in several other ways—(i) by sawing across into slabs of the required thickness and then breaking up the slabs into small fragments with a hatchet or a hammer; (ii) by shaving with a plane or on a lathe; or (iii) by hand chopping with an adze or axe.

The wood is now in a condition to be subjected to the action of the lye or solvent to be used.

The digestion may be effected in boilers over an open fire, but it is best to employ a boiler surrounded with a steam jacket. During the digestion the contents of the boiler require to be constantly stirred. Hence either a revolving boiler should be used or the fixed boiler should be furnished with a revolving agitator. To facilitate and expedite the digestion it should be possible to exhaust the boiler, previously filled about two-thirds with chips, of air before introducing the lye. The result of the exhaustion is that the lye penetrates at once into the wood. The boiler should be heated only gradually.

For the lye the substance now almost universally used is bisulphite of lime, which is easily prepared at the cellulose factory itself, by burning sulphur, or, what is more economical, iron pyrites, in a special oven (see annexed sketch), and passing the gas thus obtained over limestone, over which water is constantly made to trickle, or into lime water in a milky condition.



The oven, represented above, requires to be described. The plinth (about 32 inches high), arches, and side walls are of brick masonry, while the front and back walls and the floor, roof, and chimney are of thick cast-iron. The floor is made to slightly slope forwards. Iron partitions

about 4 inches high and running parallel to the brick walls, divide the oven along the floor into 3—6 equal compartments, each compartment having a door in the front wall. Just below the doors small holes are pierced to let in air, and a sliding panel regulates the opening and shutting of the holes according to the strength of draught required, which should be strong enough to prevent distillation of the sulphur, and not so strong as to cause the formation of sulphuric acid. If sulphur is used, from 12 to 14lb are consumed per square foot of the floor of the oven in 24 hours.

As the fumes of sulphurous acid are strongly poisonous, air containing only 0·04 per cent. of them being already difficult to breathe, the limestone, broken up to the size of ordinary road-metal, is placed inside a high narrow tower (like a chimney), so that the whole of the gas may be used up before it can reach the vent. The gas being extremely soluble in water,* care must be taken to keep the stones constantly wet by allowing water to drip on them in a fine shower like rain.

The chimney of the oven is connected with one side of the tower near the bottom. The water, dripping off the stones, carries, down with itself calcium bisulphite in solution, and runs out through the bottom of the tower into special tanks.

In his large factory at Kehl, Herr Trick is careful not to let any of the acid escape into the air. Alongside of the usual tower is a second one filled with broken dolomite and into which excess acid from the first, if any, at once passes. Another speciality of Herr Trick's, as may already be guessed, is the use of a mixed lye of the bisulphites of lime and magnesia, and he accordingly puts into the first tower ordinary limestone (carbonate of lime) as well as dolomite. For quicker action he uses tufaceous limestone, which he is lucky enough to find in Baden itself. This composite lye is apparently much stronger than the simple calcium bisulphite lye, since Herr Trick puts into the boiler also whole disks of wood more than an inch high obtained by merely cross-cutting the logs and billets without splitting them. He does not even take the trouble to gouge out the knots, which remain behind on the sieve (called by him *Astfänger* = literally, branch-catcher) when the separated fibres pass through.

The time during which the digestion is carried on varies with the wood used and with the size of the boiler. From 6 to 10 hours are usually sufficient, but M. Weibel of Norvillars, already referred to on page 1, employs boilers of a mean capacity of 77,000 gallons, and he allows 70 hours for the digestion.

The lye, when the operation is over, is of a deep brown colour. It is run out and treated for recovery of the salt.

As sulphurous acid acts on iron and copper, the boiler requires to be lined with a metal capable of resisting it.

The wood is now nearly pure cellulose with a little mechanical admixture of certain impurities. The pieces or chips still retain more or

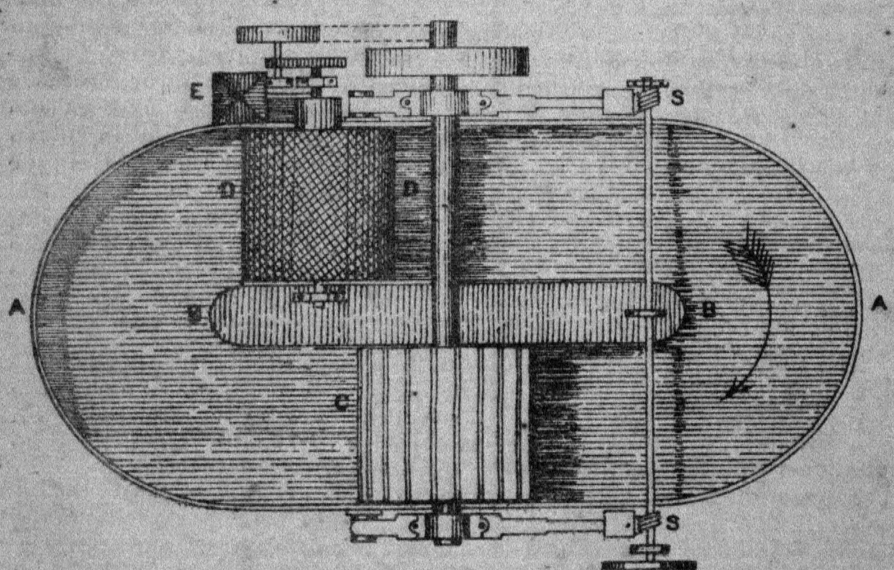
---

* 1 litre of water dissolves at 0° C. 79·8 litres of the gas, at 10° C. 56·6 litres, and at 20° 39·4 litres.

less their original form and size, but very little force suffices to break them up into their separate component fibres. If, however, a fixed boiler with a mechanical agitator has been used, the pieces are already more or less thoroughly broken up before leaving the boiler.

A revolving boiler can be emptied without difficulty. Herr Trick empties his boilers, which are fixed and horizontal, through a large circular hole in the bottom. The contents run out into a tank below. The lye is drawn off through a pipe. Fresh water is introduced and drawn off in the same way in order to remove most of the remaining lye, and the cellulose is carried away by means of a chain of buckets, working on the principle of a Persian Wheel, into horizontal cylinders inside which a strong axle armed with numerous long blades is constantly revolving. These tear up the disks of wood, separating the digested fibres from the undigested hard knots. As the broken up mass passes out, the latter remain behind on the *Astfänger* already mentioned above.

The next operation is to thoroughly wash the cellulose and reduce the fibres, now of different lengths, to short equal lengths, so as to form a homogeneous mass. This is done in the apparatus here represented, termed in French a *pile de concassage.*



AA is a large elliptical iron trough with a flat bottom. BB is an iron wall fixed in the centre, so that the space between it and the sides of the vat becomes an elliptic canal of uniform width. CC is a strong wheel armed with 50—70 sharp steel blades arranged in pairs and fixed on the circumference parallel to the axis.

Immediately under the wheel, in the bottom of the trough, are fixed 8—14 similar blades parallel to one another, but in planes forming a slight angle with the blades on the wheel. The supports on which the axle-tree of the wheel rests can be raised or lowered by means of the endless screw arrangement SS, so that the distance between the blades of the wheel and of the foot-plate can be perfectly adjusted. The object of the non-parallelism of the one set of blades to the other is to make them more effective in rending asunder and cutting up the cellulose fibres.

The canal being filled with water and cellulose from the boiler, the wheel is made to revolve from left to right, thus setting in motion the water and cellulose in the opposite direction. The blades of the wheel, acting like paddles, draw the cellulose forward and pass it between themselves and the blades of the foot-plate. The wheel is driven so as to make 100—200 revolutions a minute, according to the fineness of the cellulose required.

As the cellulose fibres, besides being separated and cut up, have also to be thoroughly washed, the water has constantly to be renewed. This is effected by the washing drum DD, which carries away the impure water as fast as fresh clean water enters the trough through a feed-pipe. The two faces of the drum are completely closed with wood or iron plates, while the circumference is formed of finely perforated metal, through which only water containing the impurities in solution or suspension can pass. Inside the drum is fixed an Archimedean screw or an arrangement of buckets on the principle of the Persian wheel, in order to carry off the water that enters through the perforations. The water disappears finally through the funnel E attached to a waste pipe.

The washing must at first be effected with hot water until the remains of the lye and the encrusting matters of the original wood have been completely removed.

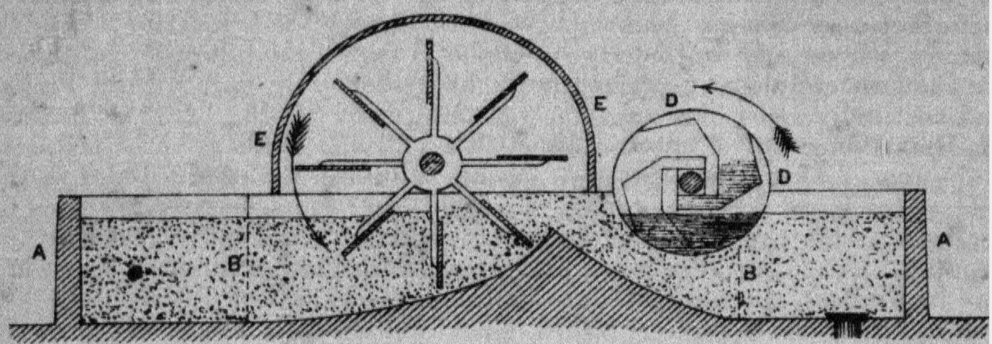
The movement taken off the washing-drum arrangement regulates exactly the inflow of fresh water, which is made to enter to the right of the drum in order that it may make a complete circuit of the canal before it can enter the drum.

The next process is bleaching. It can be dispensed with for the manufacture of papers which are not required to be perfectly white, as the digestion alone with the sulphites yields a nearly white cellulose when light-coloured woods, like spruce, silver fir, poplar, etc., are used (*see* specimen of unbleached specimen accompanying, and compare it with the bleached samples).

The bleaching substance used is chloride of lime, to expedite the action of which a slight addition of sulphuric or hydrochloric acid is advisable, otherwise the process is a very slow and tedious one.

The bleaching may be effected by placing the cellulose loosely in vats with perforated bottoms and constantly moistening it from above

with the bleaching fluid, which then passes through the mass and drips out from below: but the result is never uniform, and it is better to use a special apparatus, a convenient pattern of which is shown in the following sketch:—



AA is a trough of the same shape as that represented on page 6, and built of concrete, cemented bricks or wood, and of a capacity of 100—200 gallons. The place of the cutting and rending wheel is taken by a wheel with large paddles, and instead of the blade-bearing foot-plate, the floor of the canal is raised, so as to subject every portion of the mass to be bleached to thorough agitation and air action. The wheel makes 200—300 revolutions a minute.

The washing drum is placed at the end opposite to that in the apparatus on page 6. In order to show the drum, a part of the wall built on the middle line of the ellipse is represented as removed. The arrangement in the inside of the drum shown in the sketch above is more convenient than Archimedean screws or the principle of the Persian wheel. Partitions running through the entire length of the drum divide the space inside into buckets. Each bucket, as it rises out of the bleaching mass, brings up a certain quantity of water. The drum continuing to turn, the water ultimately reaches the end of the bucket, whence, through a hole in the further side of the drum, it flows out.

EE is a metallic or wooden cover placed over the paddle wheel to keep in the splash. After the operation the trough is emptied through O.

Usually 25—30lb of chloride with 150 gallons of water are used with 100lb cellulose (air-dry weight).

The cellulose is now ready for delivery to the paper-maker. For facility of packing, transport, and testing for quality, it is made up into large thick sheets like card-board, which are hung up to dry in sheds with open trellis-work walls.

With the use of sulphites, especially that of magnesia, the yield of cellulose is usually between 50 and 60, and may even run as high as 66 per cent. of the weight of the wood. Recently in Northern Germany sodium sulphate has been tried instead of caustic soda, which the sulphites have supplanted. The sulphate has its great cheapness to recommend it, but I can say nothing more regarding it, as I have been unable to visit a factory using this salt.

I possess no certain data regarding the cost of extracting cellulose, manufacturers having been chary about giving me information. In Saxony, where only wood-pulp is made, a paper manufacturer informed me that the cellulose he mixed with his wood-pulp came from Baden and cost delivered at his factory 9 shillings per 100lb. And in France, M. Bichelberger of Clairefontaine, Etival, who makes both cellulose and paper, told me that the cost of the cellulose he used figured in the cost of his paper in the proportion of 60 to 100. The average price he realises for his paper is just over 18 shillings per 100lb. Putting his profits at 5 per cent. (the paper and cellulose business is not a very paying one in France), the figure for the cellulose works out at 10 shillings per 100lb. This is a higher figure than the cost of Baden cellulose in Saxony, but the German product is notoriously cheaper than the French product, as the next paragraph will show.

At the commencement of the Nineties the French wood-cellulose and wood-pulp industries had reached so low a stage that the Syndicate of wood-paper stock manufacturers of France addressed a petition to their Government asking it to protect them against foreign importations by levying a tax on these and removing the duty on foreign wood imported expressly for the manufacture of paper-stock. They complained that while France exported only ½ per cent. of its importations, these latter were constantly on the increase. From 211,680,000lb in 1888 they had risen to 251,370,000lb. in 1889, while the home manufacture totalled only 143,325,000lb. In 1888 Norway sent to France 99,225,000lb, Sweden 24,255,000lb, Germany 33,073,000lb, and Switzerland 26,460,000lb.

The result is that the following customs dues are now levied :—

On wood-cellulose	*Tarif général*	2·50 ;	*tarif minimum*	2 fr.	per 100	kilogs.
„ wood pulp, dry	„	1·50	„	1	„	„
„ „ wet	„	0·75	„	0·50	„	„

while the rates on wood suitable for manufacturing these products have been reduced, respectively, to 3 and 2 centimes per 100lb. Notwithstanding this protection of the home industry, the foreign products still sell cheaper.

MANUFACTURE OF WOOD-PULP.

This is often termed *mechanical* wood pulp in contradistinction to the other, which is called *chemical* wood-pulp. But the terms I have used are more logical, as the latter being entirely fibrous, is no pulp at all.

Whatever the details of procedure, the wood is always ground directly into a paste on a grindstone or on a rough iron wheel (very exceptional), or first torn up into small shreds with plenty of water with powerful machines and then ground fine between two grindstones. In the latter case the product is more fibrous and therefore better adapted for the paper maker, but, on the other hand, the special machines required are costly both to purchase and keep in repair, and the powdery product of the direct grinding is found to be quite good enough for all purposes when mixed with a sufficient amount of cellulose. Accordingly the system of direct grinding is now all but universal.

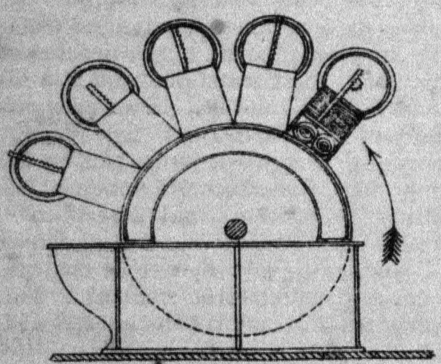
The pulp may be required (i) for paper stock and for the manufacture of xylonite, etc., which form an extremely good substitute for ivory and bone, or (ii) for cardboard, for the manufacture of boards, mouldings, buckets, etc., and for filling in steel skeletons of wheels, etc. In the former case the pulp has to be fine and of perfectly even quality, and accordingly all hard knots must be previously removed, the wood should not be pressed to much against the grindstone, which should revolve very rapidly, and lastly, the product of the first grinding must be refined, *i.e.*, ground over again between two stones like flour. In the latter case, if only thick card-board is to be made, or the pulp is to take the place of wood, not a single knot need be removed, and the refining process may be dispensed with: moreover, to render the fibres more easily separable (thus quickening very appreciably the process of grinding) and to preserve and even increase their strength and toughness, the wood is previously split and steamed for several hours previous to being ground. In M. Boucher's factory at St. Amé in the Vosges the steaming is continued for 14 hours at a pressure of 57lb to the square inch. This prolonged steaming has the effect of making the wood (spruce of the previous year's felling) as brown as oak heart-wood, but rendering the fibres so easily separable and strong that they can be pulled off in thin strands like hemp, and can, like hemp, be twisted without breaking (*see* short strand accompanying this report). This accounts for the toughness and leathery texture of M. Boucher's cardboard, of which I annex three samples.

It will suffice to describe the process in which only the action of grinding is employed.

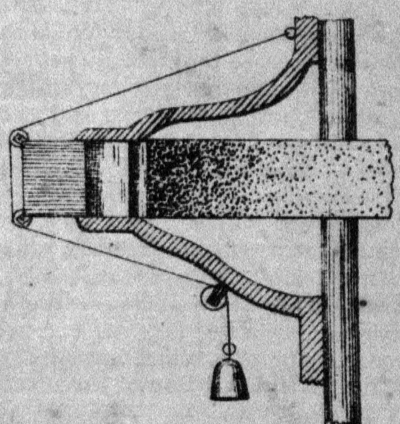
The grindstone is merely a cylindrical block of the usual sandstone about 4 feet in diameter and 1½ feet high, and fixed on a vertical or horizontal axle-tree. The grinding surface has to be roughened every 1—2 days. The wood is best ground against the circumference of the block, as it is there that the velocity is greatest and is the same for every portion of the wood under treatment. Moreover, it is only by this means that the stone is made to wear uniformly.

The wood is always placed so that its fibres are parallel to the grinding surface, against which it is pressed and pushed forward either by a rack and pinion arrangement, or, better still, because then the pressure is constant and uniform and self-acting, by suspended weights.

Both these systems are shown below. The pressure required varies between 11 and 22lb to the square inch, according to the hardness of the wood and the coarseness of the pulp to be obtained.



Vertical Mill, with Rack and Pinion arrangement for regulating pressure.



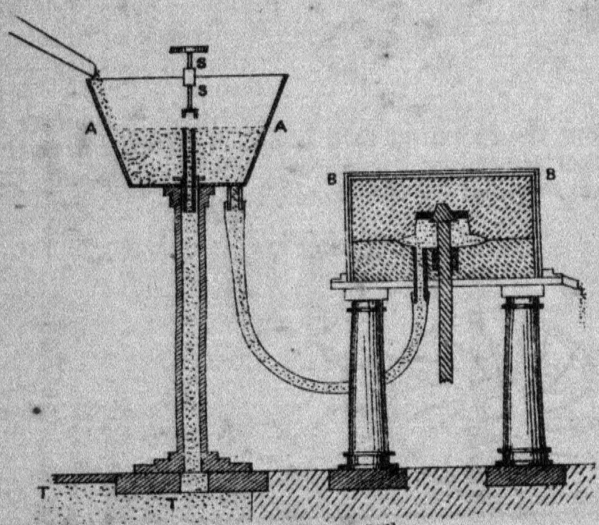
Horizontal Mill, with weight pressure.

Water is made to flow constantly over the stone not only to soften the wood, but also to carry away at once in suspension the particles ground away. For pulp for boards the stone makes about 80 revolutions a minute: for pulp for paper the speed may be double.

From the grinding mill the water containing the ground wood passes on to a wire sieve which retains all chips and large particles. These are, in the French factories I visited, ground up again in mills similar to mortar and cement mills, and when fine enough, are returned into the

straining box: but, I imagine, they yield stuff fit only for card-board and other employment not requiring fine uniformly ground material.

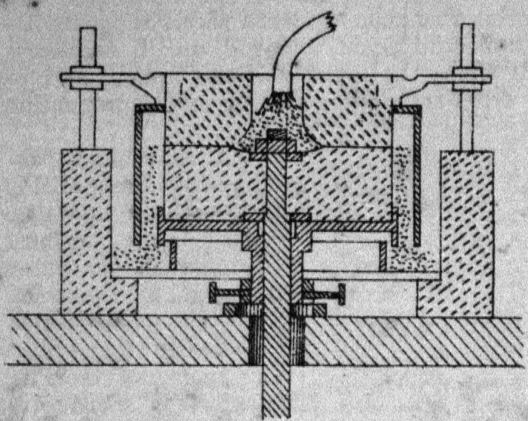
What has passed through the straining box is run into a tank furnished with a mechanical agitator to keep the wood particles constantly in suspension. From this tank the liquid, pumped up, if necessary, passes into the refining mill, where the wood particles are reduced to uniform size and thoroughly freed from all encrusting and impregnating matters.



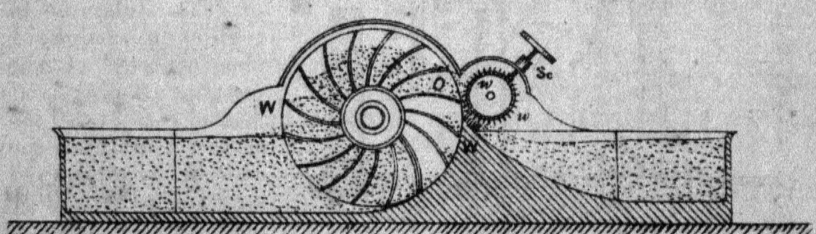
Refining Mill.

A convenient pattern of refining mill is represented opposite. AA is a cistern into which the water containing the wood particles in suspension are constantly pumped up from the tank TT below. The cistern is supported on a hollow pillar open at both ends, the upper being fitted with a telescopic tube *tt*, which can be raised or lowered by means of the screw *ss* and is perforated near the top. The object of this tube is to regulate the height of the contents of the cistern. A pipe fixed to the bottom of the cistern connects the cistern, by means of an India-rubber or leather tube, with a metallic tube passing through the nether millstone, which is of course fixed. The two stones are in contact for only about the outer half of their radius, being hollowed out slightly in the middle. The rapidity with which the wood particles pass out from between the stones, *i.e.*, the length of time during which they remain subject to the action of the stones, depends on the height of the liquid in the cistern AA. The higher it stands, the greater is the pressure exerted in the hollow between the stones and the more rapid the exit of the wood particles. BB is a movable wooden cover placed over the stones to confine the splashing of the liquid leaving them.

The adjoining sketch represents another pattern of refining mill, in which the stuff to be refined enters from above, and it is the nether stone which revolves.



The refined pulp is at once made up into thick sheets or boards for export, or if paper is made in the same establishment, it is deprived of its water and mixed in the required proportions with cellulose preparatory to being formed into paper. In M. Louis Geisler's factory at Les Chatelles near Raon l'Étape, this preliminary refining is omitted, and the stuff from the grinding mill is mixed directly with the cellulose in the paper-maker's refining apparatus, which effects all the refining required and is represented by the sketch below.



It is exactly like the apparatus figured at page 8, except that the wheel and foot-plate are replaced by another arrangement and the floor of the canal is raised in front on the right. WW is a wheel divided by curved paddles into a number of buckets which carry up the stuff in the canal and discharge it at O, where it passes between the small wheel *ww* armed with numerous close-set sharp thin blades and the foot-plate *fp* similarly furnished. The wheel WW is about 4 feet in diameter and makes one revolution per minute, while the armed wheel *ww* makes about 250 in the same space of time. In this way the fibres are all cut and reduced to the necessary fineness for the quality of paper required. By means of the screw *sc* the wheel *ww* can be raised away from the foot-plate, so that when the half stuff has been sufficiently reduced it can still be kept in circulation to become

thoroughly mixed. It is at this stage that size, kaolin, powdered gypsum, etc., are introduced to increase the weight of the paper, and that colouring matters are added when coloured paper is required.

Through the great kindness of Herr Oscar Bretschneider, owner of a wood pulp factory at Sehma in the Erzgebirge and of Herr Ernst Hofmann, machine manufacturer of Niederschlema, both in Saxony, I am enabled to give here the figures of cost and outturn of a factory disposing of a fall of water yielding a force of 100—120 horse-power :—

Cost of Machinery.

Items.				Cost.	
Running Number.	Number		Weight in lb	Per each.	Total.
				£	£
I	3	Vertical grinding mill, width of grinding surface 20 inches, complete, save stones	35,310	100	300
II	1	Wooden tank for collecting stuff from grinding mill	154	2½	2½
III	1	Straining box, wooden sides, iron frame, copper bottom and eccentric driving gear	550	15	15
IV	2	Refining mill, complete, save stones .	6,600	45	90
V	3	Straining box with perforated copper bottom for stuff leaving refining mill	5,050	30	90
VI	1	Agitator for masonry vat to hold refined stuff, complete with driving gear .	1,700	21	21
VII	2	Machine for forming sheets of pulp 52 inches wide, complete but without felting	11,000	79	158
VIII	1	Pump for half stuff, diameter of piston, 5·9 inches	1,320	26	26
IX	1	Rotating pump for water . . .	990	34	34
X	1	Grappling irons to hold stones of refining mill, with carriage . . .	286	8	8
XI	1	Elevator for passing up wood from ground floor to floor of grinding mill.	1,012	22½	22½
XII	1	Circular saw, complete . . .	440	17½	17½
XIII	1	Iron water-tank, 440 gallons capacity .	880	8	8
XIV	...	Gearing for transmission of force @ £1 per 100lb	12,500	...	125
XV	3	Grind stones for grinding mill . .	5,720	5	15
XVI	2	Pair grind stones for refining mill .	6,600	7½	15
XVII	...	Copper water-pipes . . about	440	...	20
XVIII	2	Felt sheets	...	2½	4½
XIX	1	Leather belt for elevator . . .	...	2	2
XX	1	Turbine for a fall of 23 feet and a water-supply of 53 cubic feet per second, complete . . . . . about	15,400	225	225
*XXI	...	Belting for driving machinery . .	...	...	100
		Total . .	105,992	...	1,299

The above prices are exclusive of transport and packing. Many of the apparatus could be made in India itself. The freight to Bombay

or Karachi *viâ* Hamburg, at the rate of 26*s.* a ton, would amount to about £65, so that delivered in Upper India the total cost of the machinery would come to little short of R28,000. Buildings, setting up, and works for leading the water would cost approximately R32,000. Thus the total outlay would be R60,000.

Herr Bretschneider, whose factory contains almost the same amount and style of machinery, estimates that in a working day of 24 hours the outturns would be as follow, according as pulp for paper or cardboard was required :—

Wood consumed.		Yield of pulp.		
Quantity, cubic feet.	Weight, lb	Dry weight, lb	Percentage of weight of wood.	Average yield in dry weight per cubic foot of wood.
163—177	11,025	3,675	33⅓	21·7
		or		
184—204	13,230	4,410	33⅓	22·8

To serve the machinery, and bark and cut the wood, two relays of 1 foreman and 6 workmen each are sufficient. With Indian labour these numbers would have to be quadrupled. On the other hand, the wages would be less than a quarter of that earned by German workmen.

The present prices realised by Herr Bretschneider are—

for pulp for paper making 4·08—4·54 shillings per 100lb dry weight,
and
for pulp for cardboard making 3·63—4·08 shillings per 100lb dry weight.

When the paper manufactory is in the vicinity, or the paper-maker takes delivery at the wood-pulp factory itself, the sheets of pulp are delivered wet, and the convention is adopted that 3lb of wet pulp = 1lb dry.

The prices realised this year in the forest for spruce pieces suitable for the pulp-maker have been as follows :—

Pieces 11½ feet long and 5-6 inches middle diameter 4·0*d.* per cubic foot solid.
Do. do. 3-4¾ do. do. 3·7*d.* do.

Billets 40 in. long and from 3—6 in. middle diameter 17*s.* per 100 stacked cubic feet.

In India the wood delivered at the factory would cost at least 50 per cent. less than the above prices.

It is interesting to estimate the probable earnings and out-goings of a mill erected in India on the plan of the one for which figures of cost and outturn have been given above, assuming that only pulp for paper is made.

The daily expenditure would be—

	R	a.
140 maunds wood at 3 annas	26	4
3 foremen at R1 on an average	3	0
24 workmen at 5 annas	7	8
Oil, lubricants, etc.	1	4
Total per day	R38	0

The daily take-in, supposing that the 100lb of pulp sold for only R2, would be, for 3,650lb, R73. Thus the daily excess of receipts over expenditure would be R35. Reckoning 300 working days in the year, the yearly excess would amount to R10,500.

We may safely estimate the average life of machinery, buildings, etc., at at least ten years. The cost of renewal R60,000, spread over ten years would be R6,000 a year. Thus there would be an annual profit of R4,500 or 7½ per cent. on the original capital outlay of R60,000.

In the preceding calculation the most adverse conditions have been assumed, so that in reality the profits would not be less than 10 per cent.

Herr Weidenmüller in Antonsthal near Schwarzenberg in Saxony makes both wood-pulp and paper. He enjoys the advantage of a fall of water of 131 feet with an outflow of 53 cubic feet (=331¼ gallons) per second, yielding 600 horse-power. A part of this power is of course consumed by the paper-making machinery: yet with three large horizontal grinding mills he can use up 530 cubic feet of wood in a day, or three times more than the mill for which estimates have just been given. It is thus evident that with more than 120 horse-power the outturn would increase in greater ratio than the expenditure on labour and machinery, the two most costly items, so that the profits would be very much more than 10 per cent. In the Himalayas a fall of 130 feet could be obtained almost anywhere.

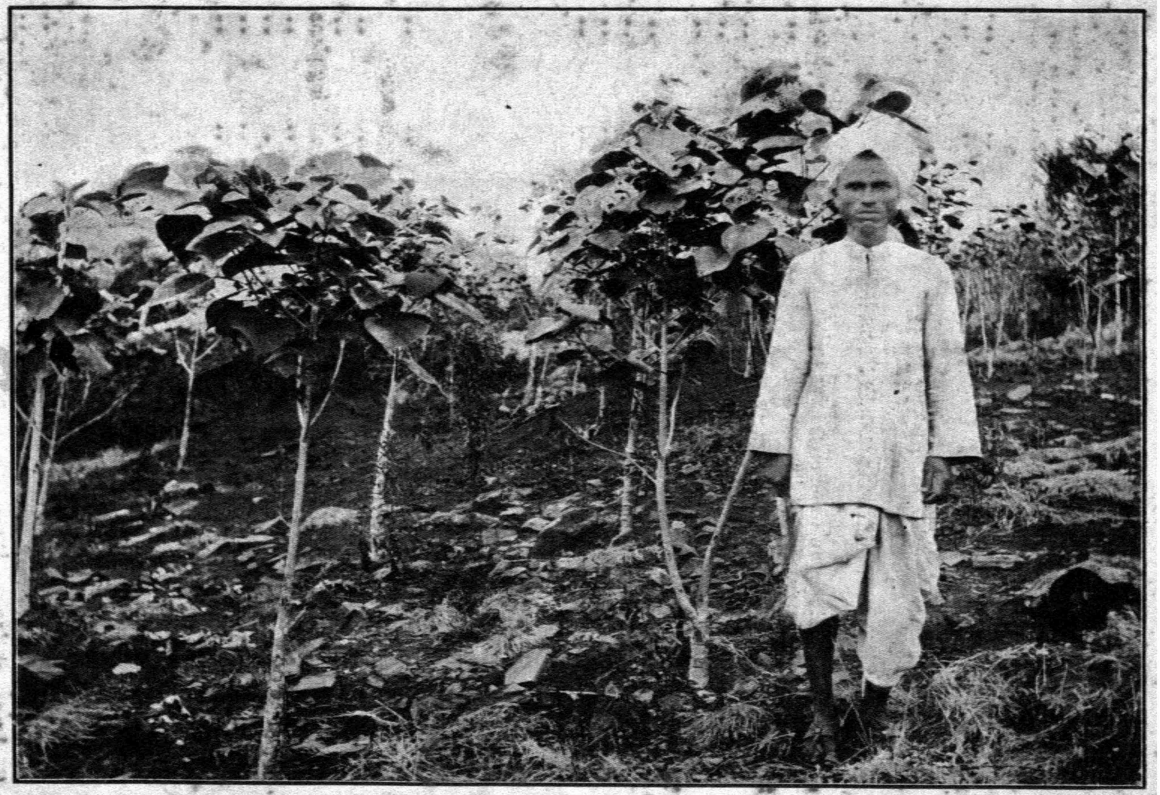
And indeed it is in the Himalayas, where actually nearly all our fir trees are either killed standing or are allowed to die and rot in the forest, that wood-pulp factories would be established with great benefit, not only to the exchequer and to the wealth of the country, but also to the forests themselves; for at present cleanings and thinnings are out of the question, and even trees of exploitable size are allowed to occupy uselessly space in the forest, because no one will take them even gratis. If Government cannot induce private enterprise to undertake the business, then it should establish a factory or two to lead the way. Such factories would so soon become a patent success that they could be profitably sold to private persons or companies after five years of State management. They would be the commencement of an enormous industry, for with our cheap labour and cheap raw material, we could not only drive all foreign-made paper out of India, but export several hundred million pounds of pulp, as well as of cellulose. We have here an opportunity of utilising every year at least 10,000,000 cubic feet of wood that at present goes to pure waste and embarrasses the treatment and management of our forests.

In the forests in the plains also there are many species which have little or no value, but which may prove to yield good material for cellulose or wood-pulp, such as the Bombax, species of *Lauraceæ*, *Sterculiaceæ*, etc. We know that the genus *Picea* is excellent for the purpose. Hence factories established for our spruce are sure to be successful, and at these factories, various other likely woods could be tried and thoroughly tested at little or no expense.

Rec (XP) 11A/2 Jan 26.2 34

DUPLICATE

DUPLICATE



One year old growth of *shivani* (*Gmelina arborea*) and sandal.

DUPLICATE

114.

Rev(LR.) 11 Ra 2/34

TABLE OF CONTENTS

CHAPTER I.

CONSTITUTION OF STATE FORESTS.

1. Alteration in area 1
2. Forest Settlements 2
3. Demarcation 2
4. Forest Surveys 3

CHAPTER II.

MANAGEMENT OF STATE FORESTS.

1. Regulation of Management—Preparation and control of regular working plans, and preliminary working plan reports 4
2. Communications and Buildings—
   (a) Roads and Bridges 5
   (b) Buildings 5
   (c) Miscellaneous works 5
3. Protection of Forests—
   (a) General protection 6
   (b) Protection from fire 8
   (c) Protection from cattle 10
   (d) Protection against injuries from natural causes . 12

CHAPTER III.

SILVICULTURE.

1. Afforestation and Regeneration of Forests—
   (i) General progress of areas under regeneration .. . 14
   (ii) Establishment of reproduction under working plans or schemes—
      (a) Mainly natural 15
      (b) Mainly artificial .. . 16
   (iii) Plantations and other forms of regeneration not under working plans or schemes 17
   (iv) Tending 19
   (v) General 19
2. Tending of the growing stock 19

CHAPTER IV.

EXPLOITATION.

(a) System of Management—
   (i) Major Forest Produce 21
   (ii) Minor Forest Produce 21
(b) Agency of Exploitation—
   (i) Departmental agency 22
      Timber depots 23
      Firewood depots 25
      Private saw mills 25
      Cart depots 25
      Messrs Howard Brothers' Timber Agency . . . 25
   (ii) Purchasers 26
   (iii) Rights, Privileges and Free grants 28
(c) Outturn and sources of Forest Produce 29

CONTENTS

PAGE

CHAPTER IV-A.

FOREST ENGINEERING BRANCH.

1. Surveys 30
2. Designs and Drawing work 30
3. Construction 31
4. Forest Exploitation—
   (a) Mechanical extraction 31
   (b) Sawmilling 32

CHAPTER V.

Financial results 38

CHAPTER VI.

Research and Experiments 47

CHAPTER VII.

Administration 56

CHAPTER VIII.

General 60

LIST OF ILLUSTRATIONS

Serial No.	Description.	Facing page
I.	*Southern Circle.*—One year old growth of *shivani* (*Gmelina arborea*) and sandal	Frontispiece
II.	*Wind fall.*—Karachi Division, Sind Circle—Flood water softens the soil and wind then uproots the exposed stems	13
III.	*Bahaman Forest.*—Larkana Division, Sind Circle—Type of forest which, it is hoped, will be irrigated by the Barrage Canals	13
IV.	*Babul* seedlings along deep trenches. About three months old on 4th December 1930—Sind Circle, Hyderabad Division	15
V.	Same Trench on 19th February 1932—*babul* seedlings about 18 months old	15
VI.	A young *babul* crop six years old. Ready for thinning—Sind Circle, Hyderabad Division ..	20
VII.	Ten year old *babul* with thinnings completed—Sind Circle, Hyderabad Division	20
VIII.	Experimental work with a 30 Caterpillar Tractor in N. D., Kanara—Caterpillar snaking logs ..	31
IX.	Experimental work with a 30 Caterpillar Tractor in N. D., Kanara—Caterpillar loading logs by means of cable with spreader and tongs	31
X.	Experimental work with a 30 Caterpillar Tractor in N. D., Kanara—Loading logs on to the trailers..	32

List of Trees and Shrubs mentioned in the Report and their Scientific names.

English and Vernacular names.	Scientific name.
Ain, matti	*Terminalia tomentosa.*
Anjan	*Hardwickia binata.*
Babul	*Acacia arabica.*
Bahan	*Populus euphratica.*
Bamboo	*Dendrocalamus strictus.*
Ber	*Zizyphus jujuba.*
Blackwood, shisum ..	*Dalbergia latifolia.*
Dindal, dhavda	*Anogeissus latifolia.*
Dhamni	*Grewia tiliæfolia.*
Eucalyptus	*Eucalyptus globulus.*
Heddi	*Adina cordifolia.*
Hirda	*Terminalia chebula.*
Honne	*Pterocarpus marsupium.*
Jamba	*Xylia xylocarpa.*
Kalamb	*Stephegyne parvifolia.*
Kandi	*Prosopis specigera.*
Kashid	*Cassia siamea.*
Khair	*Acacia catechu.*
Kharsing	*Stereospermum xylocarpum.*
Lantana	*Lantana camara.*
Mango	*Mangifera indica.*
Nana	*Lagerstroemia microcarpa.*
Nim	*Melia azadirachta.*
Palas	*Butea frondosa.*
Rosha	*Andropogon martinii.*
Safed musali	*Chlorophytum tuberosum.*
Sandal	*Santalum album.*
Shigekai	*Acacia concinna.*
Shivan, shivni	*Gmelina arborea.*
Simul, sawar	*Bombax malabaricum.*
Taikila	*Cassia tora.*
Tali	*Dalbergia sissoo.*
Tamarind	*Tamarindus indica.*
Teak	*Tectona grandis.*
Tiwas, karimuttal	*Ougeinia dalbergioides.*

FOREST ADMINISTRATION REPORT OF THE BOMBAY PRESIDENCY INCLUDING SIND FOR THE YEAR 1931-32

CHAPTER I.

1. Alteration in Area. (Forms Nos. 51 to 51D.)

The following table shows the changes in forest area which occurred during the year :—

Class of forest.	Area on 1st April 1931.	Added during the year.	Excluded during the year.	Area on 31st March 1932.
	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.
Reserved	13,717	82	83	13,716
Protected	1,160	42	50	1,152
Total ..	14,877	124	133	14,868

The areas added and excluded comprise :—

	Square miles. Gain.	Loss.
Afforestments against and disforestments in favour of cultivation	1	9
Exclusion from Protected Forest for conversion into Reserved Forest	..	7
Alluvial accretions and erosions in Sind	22	16
Transfer from Reserved Forest to Protected Forest ..	7	7
Transfer from Protected Forest to Reserved Forest ..	7	7
Transfer from one Division to another	87	87
	124	133

Net loss 9 square miles.

Exclusion of 9 square miles of Reserved Forest, chiefly in favour of cultivation, in the Central and Southern Circles and of 7 square miles of Protected Forest (Gurcharans) for conversion into Reserved Forest in the Northern Circle and the addition of 7 square miles of Reserved Forest, due to afforestments and alluvial accretions, in the Sind Circle, have resulted in a net loss of 9 square miles in the total forest area of the Presidency.

The Forest area in charge of the Forest and Revenue Departments stood as follows :—

—	On 1st April 1931			On 31st March 1932.		
	Reserved	Protected.	Total	Reserved.	Protected.	Total
	Sq. miles.	Sq. miles.	Sq. miles	Sq. miles.	Sq. miles.	Sq. miles.
In charge of the Forest Department ..	12,003	530	12,533	12,010	529	12,539
In charge of the Revenue Department ..	1,714	630	2,344	1,706	623	2,329
Total ..	13,717	1,160	14,877	13,716	1,152	14,868

The forest area in the various Circles at the close of the year was :—

	Square miles
Northern Circle	3,796
Central Circle	5,305
Southern Circle	4,622
Sind Circle	1,145

2. Forest Settlements.

Operations of the year are given in Form No. 52 for each Circle. Out of 46½ square miles of forest area remaining to be settled at the end of the previous year, 1½ square miles were eroded in the Sind Circle before settlement. Settlement of the remaining area was in progress. To this an area of 18 square miles, chiefly in the Northern and Sind Circles, was added. The area finally settled amounted to 14 square miles in Sind and 49 square miles remained to be settled at the close of the year. No expenditure was incurred.

About 7 square miles of Gurcharans in Thana proposed to be converted into Reserved Forest were excluded from Protected Forest and notified under section 4 of the Indian Forest Act. These await final notification under section 20 of the Act.

3. Demarcation.

In all 33 miles of new boundaries were artificially demarcated in the Central, Southern and Sind Circles. Of these, 14 miles of the frontier line between the Sagar-Sorab Talukas of the Mysore State and the Siddapur Range of British Territory in the Southern Circle were cleared and maintained by the Mysore Government at a cost of Rs. 933. Half of this cost, viz. Rs. 176 for cutting and Rs. 291 for maintenance was

claimed by the Mysore Government and was paid by this Department. The remaining 19 miles of new boundaries, mostly due to alterations on account of afforestments, disforestments, accretions and erosions, were demarcated without any expenditure to Government. The length of boundaries still to be demarcated at the close of the year is 45 miles in the Southern Circle. The existing boundary lines and marks in all Circles were maintained in a state of repair partly through contractors and partly through the agency of the Department, the total cost incurred in this connection being Rs. 2,801.

The boundary line between the Dangs (Surat Division) and the Baroda State was cleared to a length of 8½ miles, the trees marked on the line being sold to and exploited by contractors.

4. Forest Surveys.

Topographical survey work was undertaken during the year by No. 6 Party, Survey of India, in Kanara Northern Division of the Southern Circle. No survey work was done in the remaining Circles.

The expenditure incurred on Constitution of State Forests was Rs. 176 in the Southern Circle. No expenditure was incurred in the remaining Circles under this head.

CHAPTER II.

MANAGEMENT OF STATE FORESTS.

1. Regulation of Management.

(a) *Preparation and Control of Regular Working Plans.*

Preparation (Form No. 55).—The work of preparation and revision of Working Plans in the Presidency proper progressed steadily under the various Working Plan Officers controlled by their Conservators and the Chief Conservator. The work done during the year was as follows :—

The revised Working Plan for the Scrub Jungle and Jamner Teak Pole area in East Khandesh Division was sanctioned by Government. The Working Plan for the Sandalwood forests of the Dharwar-Bijapur Division and of Haliyal and Mundgod Ranges of the Northern and Eastern Divisions of Kanara was submitted to Government and their sanction was received after close of the year.

Work in connection with the revision of the following Working Plans was carried out :—

(1) Working Plan for the Nasik Scrub and Teak Pole Jungles.

(2) Soppinhosalli High Forest Working Plan in Southern Division, Kanara.

(3) Working Plan for the Nagzari and Kalinadi Slopes of Kanara, Northern Division.

(4) Working Plan for the Satara forests.

(5) Working Plan for the Igatpuri forests.

(6) Working Plan for the reserved forests of Poona Division.

The question of altering the rotation of certain felling series of the Revised Thana Working Plan was investigated by the Working Plans Officer, who came to the conclusion that the 80 years rotation should remain unaltered. Other modifications in the prescriptions of the Plan are being considered by the Conservator.

A Working Plan for the exploitation of teak in occupied lands in the Thana District has been drawn up but its submission has been held up in view of orders from Government suspending the sale of malki teak.

The preliminary report submitted by the Gurcharan Officer in connection with the felling scheme for the Protected Forests in charge of the Forest Department and for the "Nominal Reserves" in the Thana District was approved by the Chief Conservator. A Working Plan for these forests is now being drawn up.

Inspections of the Haliyal Teak Pole area in Kanara, Northern Division and of the Yellapur-Mundgod Teak High Forests in Kanara, Eastern Division were carried out with a view to their subsequent revision.

As a result of inspection and enumeration in the Mundgod Teak Pole area in Kanara Eastern Division it was decided by the Chief Conservator that this Plan which is nearly 25 years old should be brought under regular revision in five years time. In the meantime tentative modifications in the prescriptions of the Plan are being adopted.

Under G. R., R. D., No. 6436/28, dated 16th December 1931, a Working Plans Officer was appointed in Sind from 16th December 1931 for a period of five years. He is at present engaged in the preparation of a Scheme of Irrigated Forest Plantations. Next season he will commence work on a revision of the existing Working Plans.

The area under Working Plans now amounts to 8,880 square miles out of a total of 9,841 square miles for which Working Plans are considered necessary. New Plans are under preparation for 690 square miles out of 961 square miles for which Plans are required, in addition to which old Plans are under revision for an area of 1,049 square miles.

(*b*) *Control of Working Plans.* (Form No. 55A.)

Prescriptions of the Working Plans in force were adhered to as far as possible in all Circles. Most of the arrear coupes which remained unsold in the Northern Circle on account of the slump in the timber market and the Civil Disobedience Movement were sold during the year. Some coupes however remained unsold due to lack of demand owing to poor quality, inaccessibility or long leads. In the Central Circle more coupes were sold at better prices than last year. Arrears of work in the Southern Circle were due in most cases to the difficulty of attracting contractors on account of continued trade depression. Prescriptions of the Sandalwood Plans were, however, fully worked up to. Owing to want of demand for material, the work in a large number of coupes could not be completed and extensions had to be granted.

2. Communications and Buildings.

(a) *Roads and Bridges.*

Construction work was in progress on 68 miles of new roads and repairs were carried out on 1,377 miles of old roads. The total expenditure on roads and bridges was Rs. 1,34,422 of which Rs. 43,224 was for new works and Rs. 91,198 for repairs as against a total of Rs. 2,28,222 (Rs. 1,34,463 for new works and Rs. 93,759 for repairs) in the previous year. The amount charged to repairs includes maintenance charges on the Alnavar-Dandeli Railway, viz. Rs. 44,819 against Rs. 43,835 in the previous year.

The Baroda section of the Subir-Nawapur road has been completed by the Baroda Durbar. This now provides a through metalled road from Nawapur to Laochali.

The work of realigning the proposed Ozar-Saiwan road in the Northern Circle was completed by the Forest Engineering establishment during the year.

No progress could be made with the Dara-Dhadgaon road in the Central Circle for want of funds.

(b) *Buildings.*

The total expenditure on buildings was Rs. 28,992 (Rs. 5,816 on new works and Rs. 23,176 on repairs) as against Rs. 53,673 (Rs. 23,303 on new works and Rs. 30,370 on repairs) in the previous year. Owing to the urgent need for economy, works under this head were cut down to a minimum. The necessity for providing more housing accommodation for subordinates has been emphasized by all Conservators but progress in this respect is delayed owing to lack of funds.

Two buildings at Khanapur, Belgaum District (a Rest House and quarters for subordinates) belonging to the Excise Department were transferred to the Forest Department under G. R., R. D., No. 675/28, dated 7th April 1931.

(c) *Miscellaneous (other works).*

Rs. 2,540 and Rs. 7,539 were spent on new works and repairs respectively against Rs. 3,375 and Rs. 9,522 in the previous year. The expenditure under this head was incurred chiefly on wells, telephone rent, fencing of compounds, charges for water supply paid to the Public Works Department and repairs to sluices and *karias* in Sind.

Location of suitable sites for wells in the Dangs (Surat Division) continues to be a difficult matter. The Director of Agriculture consented to lend a water finder machine and to carry out an underground water survey but as Government retrenched water finding operations no action could be taken in the matter.

3. Protection of Forests. (Form No. 57.)

(a) *General Protection.*

The following statement compares the number of forest offences of the year with those of 1930-31 and the average of the last three years :—

Class of offence	1931-32.					1930-31.	Average of 1928-29 to 1930-31.
	Northern Circle.	Central Circle	Southern Circle	Sind Circle.	Total		
I Injury to forest by fire	665	720	442	216	2,043	2,124	2,139
II Unauthorized felling or removal of produce.	8,937	4,810	1,722	1,271	11,740	9,495	10,033
III Unauthorized grazing.	2,072	2,168	737	1,603	6,525	6,382	6,422
IV Other offences.	822	1,337	335	185	2,679	2,293	2,388
Total for 1931-32 ..	7,446	9,030	3,236	3,275	22,987	..	
Total of 1930-31 ..	6,349	8,397	2,763	2,785	.	20,294	
Average of 1928-29 to 1930-31.	6,778	8,259	2,931	3,014	.		20,982

As compared with the previous year, there was an increase of 2,693 in the total number offences, all the four Circles contributing thereto. There was a decrease of 81 under class I and an increase of 2,245, 143 and 386 under classes II, III and IV.

Injury by fire.—On the whole there was a decrease of 81 in the total number of offences under this head though the Central and Sind Circles showed an increase of 18 and 124 as compared with the previous year. Causes of forest fires are discussed under " Protection from fire "

Unauthorized fellings.—All Circles record an increase under this head. In the previous year much of the time of the staff was taken up in combating the Civil Disobedience Movement and efficient patroling of the forests was impossible. The increase is also partly attributed to the after-effects of the Civil Disobedience Movement and to the economic depression of the poorer classes. In Sind the increase is chiefly due to the influx of Kohistan Maldars and others owing to absence of rain in their own territory and to the low " Abkalani ".

Unauthorized grazing.—The total number of offences committed under this head increased from 6,382 to 6,525. The Divisions chiefly responsible for the increase were Panch Mahals, North, East and West Thana in the Northern Circle, Dharwar-Bijapur in the Southern Circle and Shikarpur, Hyderabad and Karachi in the Sind Circle. The Central Circle showed a decrease of 322 cases under this head.

The attitude of the villagers of Godhra Taluka in the Panch Mahals Division is reported to be defiant. The offenders in some cases in this taluka are, with the permission of the District Magistrate, being prosecuted in the First Class Magistrate's Court with a view to deterrent punishment as this taluka alone is responsible for a large number of offences. It is hoped that this measure will contribute to a decrease in cases of deliberate trespass. The increase in the Thana Divisions is attributable to deliberate grazing of cattle in closed forests. There is now no excuse for grazing in closed areas as in most instances in the Panch Mahals and in Thana the period of closure has been reduced to one-half of that formerly in vogue. Closure for the full period is imposed only when there is deliberate damage by fire or illicit cuttings. Much illicit grazing in closed coupes on the Kanara border and abuse of the concession exempting stall-fed cattle in Bijapur District from payment of grazing fees have resulted in an increase in the Dharwar-Bijapur Division. In the Sind Circle the increase is due chiefly to greater activity and vigilance exercised by subordinates in the detection of offences. The decrease in the Central Circle is mainly due to favourable conditions of rainfall and to the existence of sufficient grass outside reserved forest.

Other offences.—The total number of offences under this head shows an increase of 386 as compared with the previous year. All Circles except the Central Circle contribute to the increase. Stricter application of the transit rules with a view to preventing the smuggling of mhowra flowers for illicit distillation, mainly accounts for the increase in the Northern Circle. Encroachments in forest areas of the Sirsi-Siddapur Range are chiefly responsible for the increase in the Southern Circle. The encroachments appear to be due to demand for building sites and town expansion. Joint proposals of the Revenue and Forest Departments have been put up for disforestment of suitable areas and it is expected that encroachments will diminish when plots are given out. The Sind Circle attributes the increase to breaches of transit and game rules.

395 new cases were taken into Court during the year. 481 cases including 211 pending from the previous year were decided and of these 431 or 90 per cent. resulted in convictions. 19,206 cases were compounded and compensation amounting to Rs. 1,27,068 was recovered in 18,516 cases, the average per case being Rs. 6·9 as compared with Rs. 7·9 in the previous year. Offenders in 690 cases were let off with a warning and in 3,813 or 15 per cent. of the new and pending cases the offenders were not detected.

In Sind the following cases were taken to Court under various sections of the Indian Penal Code :—

Two forest subordinates in the Sukkur Division were assaulted while taking to the pound goats found illicitly grazing in a plantation. The offenders were prosecuted and were convicted and sentenced to fines and imprisonment. Three cases in the Shikarpur Division, one concerning

an assault on two forest guards, another relating to a theft of timber, and the third relating to alleged shooting in the leg of a forest guard while discharging his duties, were taken to Court. The first two cases ended in convictions, the offenders being punished with fines and imprisonment. In the third case the accused was discharged. Another case of assault on a forest guard in Larkana Division, while impounding goats and sheep illicitly grazing in forest, was taken to Court and the case is pending. Two cases in the Karachi Division, one of forcibly rescuing cattle, and another of illicit cutting of *babul* and assaulting subordinates resulted in the offenders being convicted and sentenced to fines and imprisonment.

(*b*) *Protection from fire.*

The figures in the subjoined statement compare the result of the two fire seasons, 1st June 1930 to 31st May 1931 and 1st June 1931 to 31st May 1932. These figures do not tally with those in appendix 58 which are for the financial year, viz. 1st April 1931 to 31st March 1932 :—

Circle.	Fire season of	Area attempted to be protected.	Failures.	Area actually protected.	Percentage of area actually protected.	Cost.	Cost per square mile protected.
		Sq. miles.	Sq miles.	Sq. miles.	Sq. miles.	Rs.	Rs.
Northern ..	1931-32 ..	3,316	66	3,250	98	15,192	4·7
	1930-31 ..	3,318	143	3,175	95	19,272	6·1
Central ..	1931-32 ..	3,830	329	3,501	91	7,660	2·2
	1930-31 ..	3,830	351	3,479	91	9,346	2·7
Southern ..	1931-32 ..	1,716	87	1,629	95	6,100	4·0
	1930-31 ..	1,567	69	1,498	90	7,472	5·0
Sind ..	1931-32 ..	501	13	488	97	751	1·5
	1930-31 ..	500	4	496	99	261	0·5
Total ..	1931-32 ..	9,363	495	8,868	95	29,703	3·3
	1930-31 ..	9,215	567	8,648	94	36,351	4·2

There has been an appreciable reduction in the number of fires and in the acreage burnt in the Northern Circle. Owing to late rains the forests remained immune from fire. Moreover the villagers generally co-operated in extinguishing fires. The inforest settlement started at Dohad in the Panch Mahals Division with a view to checking the movements of cattle thieves who start fires in order to make their way smooth, proved effective. The villagers of the Halol Range of the same Division were warned by the Collector for their hostile attitude towards the Forest Department and this had the desired effect. Mandvi Range of

the Surat Division where fire protection during the past 2 years was particularly bad owing to political propaganda showed much improvement. The warnings given to villagers last year through the Collector of Surat combined with convictions obtained in most of the fire cases taken to court had a salutary effect and the villagers are reported to have co-operated whole-heartedly with the forest subordinates.

On the whole the total area burnt in the Central Circle was less than in the previous year. In the North, East and West Khandesh Divisions, however, there were extensive fires on account of the heavy growth of grass. Carelessness on the part of villagers and travellers passing through forests resulted in an increase in the area burnt in East Khandesh. In West Khandesh the tendency on the part of the wild tribes to set fire to forest to facilitate shikar was responsible for some of the fires.

A regrettable incident in connection with a forest fire took place in East Khandesh. While engaged in extinguishing a fire which entered Charthana forest from the Central Provinces on 28th March 1932, two persons were burnt to death and six received serious injuries. The latter were treated in hospital and all have recovered. Government sanctioned compensation amounting to Rs. 900-12-0 to the sufferers and to the families of the deceased. In addition they have been granted plots of land (10 acres each) for cultivation.

In the Southern Circle there is an increase of 18 square miles in the area burnt. The Dharwar-Bijapur Division is responsible for the increase which is mainly due to the indifferent and lawless attitude of the villagers brought on by the Civil Disobedience Movement. The practice of villagers in this Division to fire forests in order to obtain an early growth of grass is said to be still active. Fire protection in the more important teak and sandalwood forests was on the whole fairly good, though a small portion of the high forest area in the Nagargali Range and some plantations in Kanara Eastern Division were accidentally burnt.

Both the number of fires and the area burnt increased in the Sind Circle. The reason for the increase is stated to be due to the low inundation and absence of rain during 1931 leaving large areas dry and highly inflammable. Notices were issued, through revenue officials, to villagers in localities where fires were extensive that punitive measures would be resorted to if intentional or careless firing of forest did not cease.

Turbans and silver bangles of an aggregate value of Rs. 494 were distributed in the Surat Division as rewards among Patels and others who had rendered conspicuous help in the Dangs. Rewards in cash were paid to villagers in the West Khandesh Division for assistance given in extinguishing fires and in some cases grazing fees were reduced. In the Southern Circle 45 villages were rewarded with free or concessional grazing for good protection. Several Patels and Kulkarnis in Dharwar and Bijapur Districts were also granted remission of grazing fees.

The following table compares the number and origin of fires for the two financial years 1930-31 and 1931-32. (*Vide* Form No. 59.)

Origin	Number of fires		Area burnt in acres	
	1931-32	1930-31	1931-32	1930-31
A. Originated in Departmental fire conservancy operations.	18	37	1,915	3,184
B. Crossing exterior fire lines.	177	202	44,706	45,966
C. Accidental (persons in forest).	712	473	144,861	46,904
D. Intentional (persons in forest).	120	123	42,394	28,330
E. Railway Engines .	13	15	604	1,147
F. Lightning .. .	1	15	2	911
G. Causes unknown ..	1,031	1,314	142,884	224,651
Total ..	2,072	2,179	377,366	351,093

(c) *Protection from cattle.* (Forms Nos. 60 and 61.)

The forest areas open and closed to grazing were as follows :—

	Sq. miles.	Per cent.
Closed to all animals for the whole year	1,419	9·54
Closed to all animals for part of the year	307	2·07
Open to all animals except browsers for the whole year.	9,663	64·99
Open to all animals except browsers for part of the year.	12	0·08
Open to all animals for the whole year	3,444	23·16
Open to all animals for part of the year	23	0·16
Total ..	14,868	..

The area open to grazing was generally sufficient and closure was relaxed as usual in cases of real hardship.

In the Panch Mahals Division the Divisional Forest Officer has recently been authorized to permit, at his discretion, grazing after five years closure in coupes which have not been burnt during that period. This will relieve the pressure of cattle on available grazing lands and go far to placate the villagers and to reduce forest fires in the Division.

The period of closure in fuel areas in the North Khandesh Division which was reduced from 10 to 5 years as an experiment last year has now been permanently fixed at 5 years under orders of the Chief Conservator. Similarly in Kolaba Division the original period of closure for 15 years has been reduced to 5 years as an experimental measure. It is reported that no appreciable damage has been caused by the change, and the earlier admission of cattle has helped to keep in check the rank growth of weeds.

The number of cattle admitted to grazing was as under :—

Circle	Horned cattle		Sheep and Goats	
	1931-32	1930-31	1931-32	1930-31
Northern ..	710,770	705,456	107,845	86,840
Central ..	694,756	670,207	276,624	221,598
Southern ..	368,000	309,055	81,858	74,551
Sind ..	31,897	33,452	40,556	36,615
Total ..	1,805,423	1,718,170	506,883	419,604

Circle	Camels		Other animals		Total	
	1931-32	1930-31	1931-32	1930-31	1931-32	1930-31
Northern ..	..	..	1,079	843	819,694	793,139
Central ..	..	..	8,025	6,474	979,405	898,279
Southern ..	..	..	95	176	449,953	383,782
Sind ..	2,367	2,096	3,115	4,042	77,935	76,205
Total ..	2,367	2,096	12,314	11,535	2,326,987	2,151,405

As compared with last year's figures there has been an increase in the number of cattle admitted to graze, all Circles contributing thereto. The increase is mainly due to the fact that a larger number of outside cattle were brought to graze than in the previous year when owing to the disturbances caused by the Civil Disobedience Movement, the owners of outside cattle did not avail themselves of forest grazing to the usual extent. There has also been greater vigilance in recovering grazing fees.

Owing to an entire absence of rain in Kohistan Mahal, the Maldars brought a large number of browsers to graze in the forests of Hyderabad and Karachi Divisions. On account of acute distress prevailing in Mahal Kohistan the Commissioner in Sind directed that the cattle of that Mahal should be exempted from payment of grazing fees up to 31st July 1932. Arrangements were therefore made to admit the cattle free on production of a pass from Mahalkaris.

Of 2,326,987 animals admitted to grazing in the forests 609,141 were allowed free. Corresponding numbers for the previous year were 2,151,405 and 614,492.

Grazing fees collected during the year amounted to Rs. 4,82,840 as compared with Rs. 4,92,962 in the previous year, the value at full rates being Rs. 21,23,787. The decrease, for which the Central Circle alone is

responsible, was due to the fact that last year owing to political agitation timely payment of grazing fees was not always made, and the fees had to be recovered subsequently at double the normal rates.

The number of cattle impounded for unauthorized grazing in open and closed forests is given in the following table :—

Circle	Horned cattle		Sheep and Goats		Other animals		Total		Total of open and Closed	
	Open	Closed	Open	Closed	Open	Closed	Open	Closed	1931-32	1930-31
Northern .	1,546	19,535	11,038	4,002	39	1,018	12,623	24,555	37,178	39,529
Central .	5,738	21,530	9,410	2,127	4	278	15,152	23,935	39,087	56,017
Southern	1,029	5,020	2,918	6,734	..	6	3,947	11,760	15,707	10,951
Sind	2,325	746	691	3,855	171	446	3,187	5,047	8,234	6,842
Total .	10,638	46,831	24,057	16,718	214	1,748	34,909	65,297	100,206	113,339
Average of 8 years from 1928-29 to 1930-31.	11,417	59,771	20,565	16,775	342	1,025	32,324	77,571	109,895	

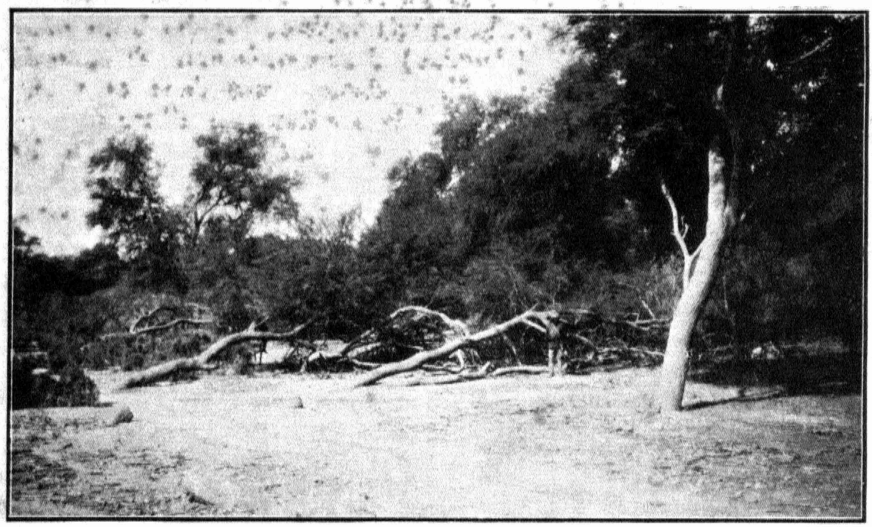
On the whole there is a decrease in the number of cattle impounded though the Southern and Sind Circles show an increase of 4,756 and 1,392 as compared with the previous year. Unlike 1930-31 there were no cases of deliberate grazing of large herds of cattle without payment. The decrease was also partly due to sufficient fodder being available outside forest areas. The increase in the Southern Circle is attributed to the misuse of the concession granted in respect of stall-fed cattle in Bijapur District and to the general economic depression. In Sind Circle the increase is chiefly due to the fact that cattle owners prefer to pay pound fees instead of grazing fees and fines, the former being less than the latter. The Conservator of Forests, Sind Circle, reports that his proposal for increasing pound fees, referred to in the previous year's report, was not sanctioned by the Commissioner.

(d) *Protection against injuries from natural causes.*

Vegetable pests.—The eradication of climbers, lantana etc. was carried out as usual. A great deal of useful work in this connection was done in the plantations of the Southern and Northern Divisions of Kanara and much benefit has resulted.

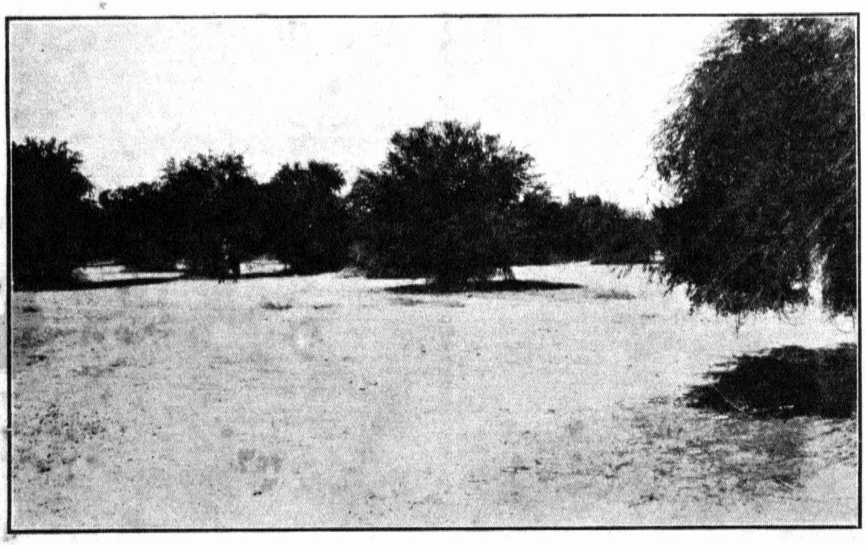
Animal pests.—Considerable damage was caused by wild elephants in some high forest plantations in Kanara Eastern Division, and by porcupines in the plantations at Gundbala, Gule, Lakeguli and Sunksal in Kanara Southern Division. The porcupine damage was severe and resulted in the complete destruction of the current Gundbala plantation while large blanks were left in Gule and Lakeguli.

SIND CIRCLE. KARACHI DIVISION.



Wind Fall.—Flood Water softens the soil and wind then uproots the exposed stems.

SIND CIRCLE. LARKANA DIVISION.



Bahman Forest.—Type of forest which, it is hoped, will be irrigated by the Barrage Canals.

Insect pests.—Damage by teak defoliators was much less severe than in the previous year. *Celosterna Scabrator* (*Cerambycidae*) was responsible for a certain amount of damage to young teak in Surat and Panch Mahals Divisions. Specimens of insects from Point and North Thana Divisions were sent to the Entomologist, Dehra Dun, for identification; they were identified as larvæ and pupæ of *Hapalia Machaeralis Wlk* (*Pyralidae*), *Hapalia* (*Pyrausta*) *Machaeralis* and *Margaronia* (*Glyphodes*) *Laticostalis Guen.* Much damage was done to young teak seedlings by grasshoppers and crickets in Kanara Southern Division causing almost complete failure of many of the areas regenerated by dibbling.

Frost and Erosions.—There has been continuous damage by erosion to the Casuarina plantations at Akshi and Nagaon in the Kolaba Division. About 1½ acres have been washed away and 262 trees damaged. In the Karachi and Hyderabad Divisions frost caused some damage to young seedlings but a good percentage of them revived later on. In Sind 16 square miles were eroded by action of the river Indus. A sum of Rs. 30,551 was realized by sale of material exploited from eroded areas, while 4,004 acres were exploited in anticipation of erosion and the material resulting therefrom was sold for Rs. 32,937.

CHAPTER III.

SILVICULTURE.

1. Afforestation and Regeneration of Forests.

(i) *General progress of areas under regeneration.*

The areas artificially regenerated continued to show satisfactory progress. In the Northern Circle some of the older plantations in the Dangs (5 to 7 years old) are practically established and exceedingly promising particularly at Dagdi-Amba near Subir and at Laochali and Rupgad in the Northern Dangs. In Thana care was taken to sow only such species as would thrive in the various qualities of soil occurring in the areas selected for regeneration and the results were very satisfactory. There are fewer failures than before and a decided saving in expense, labour and time.

The system of clearing a five foot line round each regenerated patch in older areas was continued in North and West Thana and in the Panch Mahals where it has proved remarkably effective in protecting young plantations from fire.

The plantations at Badgi, Musla and Sawarna in West Nasik continued to make healthy progress. Little was done in the past to supplement natural regeneration in the above ghat areas, but in the revised working plan it is proposed to have a progressive programme of artificial

regeneration. Despite renewed efforts to keep cattle out of closed coupes, injaili artificial reproduction suffered severely from grazing in North Thana.

In the Central Circle old plantations showed satisfactory progress.

In Kanara Northern Division, all young plantations were well protected from fire, but those under seven years in age suffered a certain amount of damage by wild animals. The Mandurli plantation of 1930 which looked very poor in the first season, was intentionally fired in May 1931, after which all weak and damaged plants were cut back. It is now much improved and compares well with other plantations of the same age.

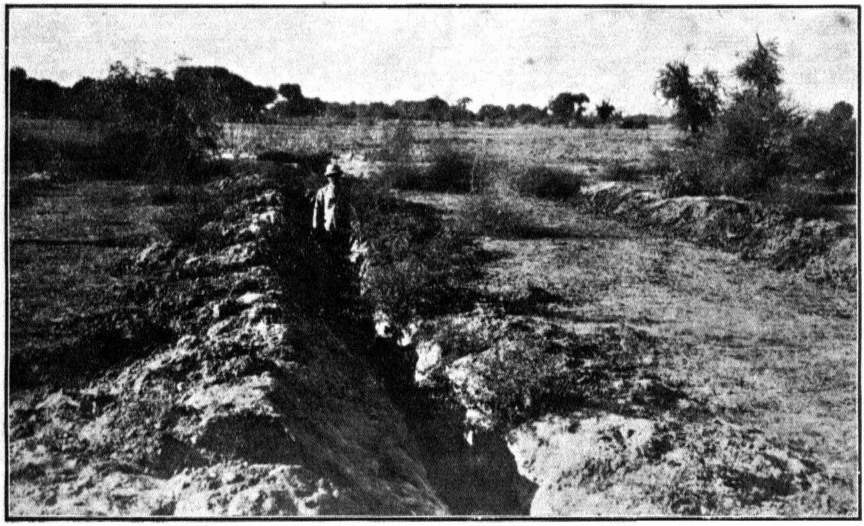
In Kanara Eastern Division, the plantations in Ganeshgudi, Wadehukli and Kolikeri are progressing. A number of areas in the II and III Working Circles, viz. in Blocks VII, IX, XI, XII, XIV and XVII have been established, but promising young growth in Blocks VIII, X, XIII and XV has been badly set back by fire. Some of the latest plantations in Blocks I, X, XIII, XIV and XVI are disappointing owing partly to the poor monsoon of 1930 and partly to bad soil. In the Mundgod Teak Pole forests also the results are discouraging owing to fires and the changing character of the soil. Here out of 20 plantations only 9 or 10 over 3 years old are completely successful.

In Kanara Southern Division, in spite of much damage from crickets and porcupine and a long break during the first part of the monsoons, the plantation area was successfully regenerated with the exception of Belargadde, Gule, Lakkeguli and Nisalnir. The long break in the monsoons had a particularly adverse effect in the *Kumri* plantations where owing to a poor start, the seedlings were easily suppressed by the surrounding growth of *ragi* although care had been taken to keep the latter well spaced from the seedlings. The *ragi* crop also was poor in most coupes and in consequence the *Kumriwalas* paid less attention to the tending of the teak seedlings. The total area attempted in the Division was 597 acres which was regenerated at a cost of Rs. 3,285. About 153 acres were planted by *Kumriwalas* the expenditure incurred thereon being Rs. 426. This worked out to Rs. 2-4 per acre raised by Ragi *Kumri* and Rs. 6-4 per acre raised departmentally the previous year's figure being Rs. 1-1 and Rs. 5-9 respectively and those for 1929-30 Rs. 3-2 and Rs. 9-3.

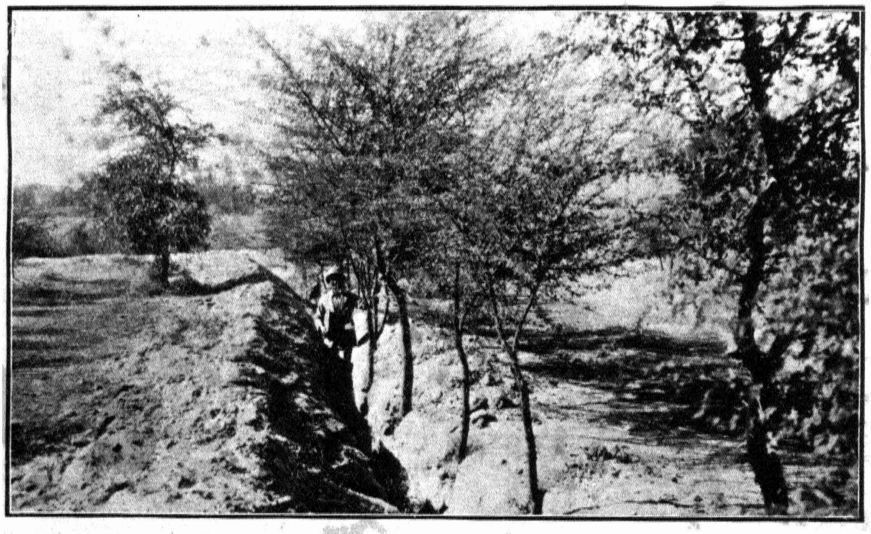
In Kanara Western Division, except in the Gund Range, where much damage was done to the seedlings by bison and porcupine, the general progress of areas under regeneration was satisfactory. In Supa two more acres out of the cleared portion were planted with Casuarina during the year in addition to two acres taken up for planting last year. From experience gained so far, it appears that Casuarina does not thrive in Supa. Hence further planting of Casuarina is being given up. Experiments are now being made with *mango*, *jamba* and *matti*. The rewooding of this area, which should never have been cleared, is not an easy matter.

SIND CIRCLE. HYDERABAD DIVISION.

Planting up "High Level" areas with *babul*.



Babul seedlings along deep trenches.
About 3 months old on 4-12-1930.



Same Trench on 19-2-1932.
Babul seedlings about 18 months old.

In Sind the year was marked by a low inundation of short duration causing a large area of forest, normally flooded, to remain high and dry. Pre-inundation sowings did not germinate, but post inundation sowings gave satisfactory results particularly in areas which in years of high floods usually received too great a depth of water. The area flooded was 220,020 acres compared with 571,500 acres last year and 630,637 acres the year before.

(*ii*) *Establishment of Reproduction under Working Plans or Schemes.* (Form No. 62-A.)

(*a*) *Mainly Natural.*

Throughout the Presidency and Sind coppice reproduction was satisfactory.

In North Khandesh owing to a bad seed year, natural *anjan* regeneration was absent and teak seedlings were scarce. In Satara, for the reasons given last year, seedling growth in the deciduous forests was poor though in the evergreens reproduction was profuse.

Natural reproduction of *heddi* and *kalamb* was excellent in the Southern Circle especially in the regeneration areas at Tatwal and Lalguli. Sandal in Belgaum and Dharwar-Bijapur occurred naturally on a satisfactory scale. In the Eastern Division Kanara, much promising natural teak reproduction was noticed in areas near Kolikeri, Kurli and Dowginalla.

In Sind, natural babul seedling growth was confined mainly to *katchas* and to those areas where seed had been dropped by cattle. Special areas were thrown open temporarily to grazing of browsers during the pod season but owing to the low inundation, germination was poor.

(*b*) *Mainly Artificial.*

The work carried out during the year is described below :—

Northern Circle.—Teak seed treated under two different methods was used for sowing. In North Thana, seed weathered by exposure during the previous monsoon was tried while elsewhere seed treated by the weekly soaking and drying method was used.

In an arid locality like the Panch Mahals, teak stump planting shows great promise, but in order to obtain a good mixture of species much more attention is now being given to raising only such species as are suitable to the soil, climatic and other factors of the tract. *Simul* germinated well but the seedlings suffered severely from damage by hares. This species does not thrive well in black soil where drainage is bad. In the Surat division, the results obtained from stump planting were eminently satisfactory and good results were obtained by inter-planting *tanach* and *shishum* with teak in the Baragaon Dangs.

In the three Thana divisions, 6,200 acres were successfully regenerated. Failures and casualties were replaced by transplants and root and shoot cuttings. The results have been very satisfactory everywhere. *Ain*

babul and *khair* were grown in flat and waterlogged areas in West Thana Division and also in areas near the coast in North Thana Division where the soil is black cotton and unsuited to the growth of teak. In Peint, treated teak seed germinated satisfactorily in the burnt patches. In West Nasik division, the existing working plan does not provide for any artificial regeneration to be carried out in the above ghat forests, and measures are now being taken to lay down a regular programme of sowing and closure.

Central Circle.—*Babul* was raised in three coupes in East Khandesh and in all coupes in the riverain *babul* areas of the Poona division.

Raising forest species in conjunction with field crops in exploited coupes was continued successfully in the Kolaba division and attempted for the first time in the North Khandesh division.

In Satara division, sandalwood regeneration was carried out on a fairly large scale. The results of sowing seed obtained from Mysore were good particularly in Bilashi forest.

In all other divisions the usual practice of regenerating exploited coupes by dibbling teak either pure or mixed with injaili species was continued. In the West Khandesh division, trials made with Burma and Kanara seed (teak) showed that local seed is in no way inferior in point of fertility.

Southern Circle.—In Kanara Northern Division, 100 acres in Series I-7A and 8B-Mandurli, 92 acres in Series IV-12 Amga and 169 acres in Series VIII-10(1) Tatwal, were regenerated during the year, the espacement adopted being 9′×9′ or 12′×6′. All the three plantations were well stocked and the maximum height in favourable places was over 6′ at the end of the first season. As usual teak coppice and natural teak and junglewood seedlings were carefully conserved to supplement the stocking. Stump planting of teak on burnt patches and sowings of junglewoods, particularly *matti* in ploughed lines outside the patches were carried out in the teak pole coupes of Haliyal and Sambrani with very successful results. Sandal also was raised in some of these coupes under cover of lantana with a fair degree of success.

In Kanara Eastern Division, the area planted during the year was 757·43 acres as against 889·6 acres in the previous year. Planting was done in the regeneration coupes of the Yellapur, Mundgod High Forest Plan, in Ganeshgudi *kumri* no. 3 of Nersol Block XVII and in the Mundgod Teak Pole and Bankapur Hangal Plan Forests. In XI-7A as an experiment, 60 scattered groupes were planted instead of a concentrated plantation, the groups ranging in area between ¼ and ¾ acre. The results were better than the plantations of the previous year. Similar groups planted in compartment 25, Lalguli, were also promising. Teak seed received from Burma was put in Block II-48, but the results so far seen are not distinguishable from those obtained from local seed.

Stump planting was also done with success at Kolikeri, Ganeshgudi and Lalguli.

The system of scattered groups is being continued this year. It remains to be seen whether these groups will require more, or less, labour in tending than large concentrated plantations and meet with less trouble from grass and climbers.

In Kanara Southern Division, 44 acres were planted with Casuarina at Kasarkod and 597 acres of clear cut coupes and regeneration areas in High Forest were artificially planted with teak at a total cost of Rs. 3,866.

In Kanara Western Division, 23·7 acres, at Chitakule and Arge, were planted with Casuarina and 251 acres of cut coupes and 75 acres in regeneration plot 9 of X-13 were artificially planted with teak at a total cost of Rs. 1,367.

In the Belgaum Division, regeneration areas Nos. 5 and 6 were regenerated with teak in 84 patches. The percentage of germination was good. Both plantations are in a flourishing condition. The usual regeneration works were carried out in the Teak Pole Coupes of the Nagargali Range, and in addition some good teak regeneration was established in Khanapur Range Fuel Coupes, the most satisfactory plantation being in Block I-3.

In the Dharwar-Bijapur Division, sowing and planting of teak was carried out in suitable exploited areas of Dharwar District. Teak planted in patches specially prepared by burning in exploited areas is satisfactory. Germination of dibbled seed was fairly satisfactory. Stump planting was tried and the results are fair. In the dry forests of Kod and Badami experiments were made with planting junglewood species, chiefly *nim*, but the results were not very encouraging.

Sind Circle.—Pre- mid- and post inundation sowings of *babul* and *kandy* were carried out in coupes, *katchas* and blanks, the methods followed being sowing in patches, mounds, drills, ploughed lines and trenches and by dibbling and broadcasting seed. The best results were obtained in Hyderabad, Sukkur and Shikarpur divisions. The area sown aggregated 18,354 acres and the quantity of seed sown was 3,138 maunds. 10,392 acres of *katchas* and grass bound areas were given out for temporary cultivation as a means of clearing the ground and preparing the soil for subsequent afforestation.

(*iii*) *Plantation and other forms of regeneration not under working plans or schemes.* (Form No. 62B.)

Northern Circle.—The upkeep of the Casuarina plantations aggregating 126 acres in the North Thana division cost Rs. 91. Dead and wind-fallen trees collected and sold during the year brought in a revenue of Rs. 275 against Rs. 253 realised last year.

Pit sowing of *anjan, khair, dhawda,* etc. was carried out by guards in 11,528 pits in East Nasik. Germination was satisfactory but as the

season advanced a large percentage succumbed to drought, damage by cattle, sheep and goats and unsuitability of soil. It is clear that different methods are required in this area and more suitable and drought-hardy species will be tried. In the above ghat forests of West Nasik the working plan for which prescribes no artificial regeneration. a certain measure of success was achieved in raising teak by dibbling seed in burnt rabs in exploited coupes.

Central Circle.—In an old gaothan of Ban in North Khandesh one acre of land was successfully regenerated with teak and injaili while in the Taloda range of the same division bamboo seedlings obtained from the Akrani were transplanted in plantation formation with good results.

In the Nandurbar range of West Khandesh 10 additional plots were given out under the agri-cum-forestry system and old *babul* plantations raised in this manner at Khokrala were thinned. In the Dhulia range the aggregate area under this system is 426 acres. Similarly in Poona the 160 acres under agri-cum-forestry were increased by 16 acres during the year in deciduous forest and 13 acres were added to the 56 acres under forest and field crop cultivation in the *babul* tract. The agri-cum-forestry system is being applied to an area of about 109 acres for the eradication of lantana in the forests of Vinzar in the Poona Range.

Southern Circle.—In Kanara Northern Division, an area of 8 acres was planted with teak on burnt patches in S.V-11 of Dandeli Range worked under improvement fellings. The result was fairly satisfactory.

An area of 46 acres in two patches—one of 40 acres and the other of 6 acres—was added to the Nagzari plantations in compartment 24 of Series XI. In this case the espacement adopted was 12′×9′ and the teak is largely supplemented by natural regeneration of junglewoods. The results obtained were very satisfactory.

In Kanara Eastern Division, attempts to regenerate sandalwood under lantana bushes were continued in 15 villages of Sirsi and 5 villages of Siddapur Range. The results are not successful owing to unusually heavy rain. The work of former years is now showing results.

In Kanara Southern Division, group planting which gave encouraging results last year, was continued in compartment 12 of Soppinhosalli and in compartment 26 of Sunkal. In all 33 groups of a total area of 24 acres were regenerated with teak stumps. The results obtained were quite good. Since it is found that the later growth of plants in small groups is considerably hampered by the shade and drip caused by the surrounding trees, larger groups will be formed in future. Similar experimental work was also carried out in Kanara Eastern Division with satisfactory results.

In Belgaum Division, the condition of plantations continues to be quite satisfactory. The experiments conducted in recent years for

regeneration of teak in the midst of pure junglewood forests of the Khanapur Range are very encouraging. Some good results were obtained in Gujnal Range by dibbling sandal seed together with other species on charcoal kiln sites. *Cassia Siamea* was found to be the best host for andal. A very successful Sandalwood "*kumri*" plantation was made near Jamboti on about 10 acres, but unfortunately this was completely destroyed by fire in May. A similar "*kumri*" plantation was made in 24 acres of a cut coupe in Patne Range. The results were also very fair though not as good as at Jamboti.

Sind Circle.—3 acres were added to the *tali* plantation in the Hyderabad Division and 3 acres were written off, leaving the net area of 540 acres unchanged. The condition of the "Newman" plantation was healthy, frost having caused no damage. Thinnings were carried out where needed. Sowing operations in *katchas*, blanks and erosion strips and in cultivations were continued.

(*iv*) *Tending.*

Weeding, cleaning, mulching, thinning, cutting back and all manner of cultural operations were carried out as usual in all Circles within funds allotted for the purpose.

(*v*) *General.*

Despite some damage by fire and other causes and an enforced curtailment of work as a result of the need for economy, satisfactory progress was made in all artificial regeneration operations.

In the Southern Circle, very satisfactory progress was made with the system commenced last year under which areas not suited for teak, or areas which contain good advance growth of young teak or junglewood of good species, are not clear felled and regenerated. In the first year there was a tendency to make these groups too small and scattered. They were in consequence much damaged by fire when the regeneration area was burnt.

The groups have since been made considerably larger, and now escape damage with the exception of a few border trees. The selection of groups for reservation was excellently done in every area inspected by the Conservator.

Taking the Circle as a whole it can be said that stump planting gave the best and most even results. Up to the present this method has been little tried in *kumri* plantations proper. It is hoped that with this method a considerable improvement in this type of plantation will be noted. Stumps can be put in at the end of May, whereas the *kumriwala* is seldom ready to plant up young seedlings till the middle of July, which is too late.

2. Tending of the Growing Stock.

In accordance with the prescriptions of the working plans and otherwise where the silvicultural demands of the crop required

them, cleanings, thinnings and other tending operations were undertaken.

Cleanings.—Frost injured trees and trees damaged by Bhills in exercise of the concession of removing head loads of fuel were cut back and the resultant material sold at a profit in the Panch Mahals. In the Dangs all inferior species interfering with teak and the more valuable junglewood species were felled or girdled departmentally ahead of the main improvement fellings. Similar work was carried out in the teak forests of North and West Khandesh. Cleanings are now a matter of regular routine in all plantations and are carried out to the fullest extent when funds permit.

Thinnings.—Thinnings were carried out in old felled coupes of Mandvi and Bulsar-Chikhli of the Surat Division. The material resulting from the thinnings in the Mandvi Range was sold for Rs. 1,488-4-0 while that in Bulsar-Chikhli was sold for Rs. 381, the expenditure incurred in Mandvi and Bulsar-Chikhli on thinnings and cleanings amounting to Rs. 584-10-0 and Rs. 147-8-0 respectively.

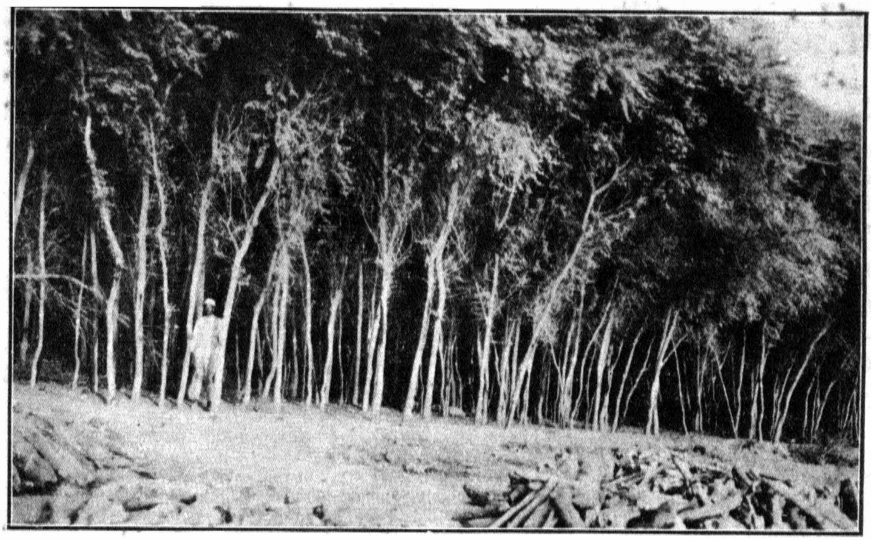
Thinnings were also carried out in accordance with the provision of the Working Plan, in 136 coupes of the North Thana Division, 60 coupes in the East Thana Division and 74 coupes in the West Thana Division. Teak standards over 42″ in girth were also marked in, and exploited along with the ordinary silvi ultural thinnings from 49 of the above coupes (14 in North Thana and 35 in East Thana Divisions). The thinnings and standards so marked resulted in a net revenue of Rs. 54,277. Most of the coupes were sold to purchasers, some were worked departmentally while some were worked by local villagers in return for the resultant material.

In the Kolaba Division, 80 coupes were due to be thinned. Of these 21 were sold standing, 25 were worked departmentally and 25 were worked by villagers free of charge taking the resultant material for their labour. 9 coupes remained unworked owing to poor growth. A great deal of useful work was done in the Southern Circle particularly in Kanara Northern Division and Kanara Southern Division. The Conservator of Forests, Southern Circle, makes the following remarks :—

> "A year or two ago there was perhaps a tendency to neglect this most important work or to defer it beyond the proper time. This is rapidly being set right and few areas are now in arrears. Marking for thinning was on the whole well done, but there was a tendency to err on the safe side and to make the thinning too light. This will be put right, for as the area under teak plantation is rapidly increasing, it will not be possible for the staff to attend to any established plantation except at reasonable intervals.
>
> "It is very satisfactory to note that these operations have paid their way in all cases."

Thinnings in Sind showed a profit of Rs. 30,558 during the year.

SIND CIRCLE. HYDERABAD DIVISION.



A young *babul* crop 6 years old. Ready for thinning.

SIND CIRCLE. HYDERABAD DIVISION.

10 year old *babul* with thinnings completed.

CHAPTER IV.

EXPLOITATION.

(a) System of Management.

(i) *Major Forest Produce.*—The areas in which various systems are in force are given in Form No. 55 B in Volume II of this Report.

Clear fellings were carried out in the Panch Mahals (with limited reservation of a few valuable species), in the greater part of the Dangs, Bulsar-Chikhli and Thana forests of the Northern Circle; in Nawapur, Nandurbar and Kolaba forests and in the *babul* forests of Poona and East Khandesh Divisions in the Central Circle; in the teak pole forests of Northern and Eastern Divisions Kanara and Belgaum, areas selected for regeneration in the Nagzari valley and the high forests of Kanara, annual coupes of the revised Inland Coastal Plan in Kanara Southern Division, fuel coupes and casuarina plantations in Kanara Southern and Western Divisions and throughout the Sind forests.

Coppice with standards.—The areas worked under this system were :—

The forests of Igatpuri (East Thana), the above ghat forests of Nasik and Dindori Ranges (West Nasik) and the forests of East Nasik Division; the *anjan* forests of East and North Khandesh Divisions, the teak forests of Poona and Satara Divisions and parts of Belgaum Division.

Improvement fellings.—These were carried out in the Mandvi forests and in selected areas in all Ranges in the Dangs; in the scrub forests of East and West Khandesh Divisions, teak areas in the North Khandesh Division and Mahableshwar forests of the Satara Division; and in some of the high forests of Kanara and Belgaum.

Selection fellings were carried out in the Peint and adjoining below ghat forests of the Nasik and Dindori Ranges and in the protected forests of the Dangs, in some *anjan* coupes of West Khandesh Division and in the Nagzari valley and in certain high forests of Kanara and Belgaum. These fellings also comprise exploitation of dead and dying sandal under regular working plans in the Southern Circle.

Simple coppice fellings were carried out in the annual coupes of the North Kanara Coastal Fuel Plan and in the scrub forests of the Dharwar-Bijapur Division.

Unregulated fellings.—These include clearings for cultivation, deadwood fellings, fellings for matchwood species, clearing of grazing grounds, felling of royalty trees in Malki lands, of reserved trees in revenue waste lands and of trees for free grants, cutting of dead and wind fallen trees and trees in erosion strips in Sind, exploitation of trees damaged by frost in Sind and the Panch Mahals.

(ii) *Minor Forest Produce.* (Form No. 64.)

Minor forest produce was mainly farmed out or sold on permits.

Hirda was collected departmentally on the share system in the Poona Division. 124 khandies and 6 maunds were collected and sent to Ghoti station at a cost of Rs. 1,399. The revenue realized was Rs. 5,717.

(b) Agency of Exploitation

(i) *Departmental Agency*

The following is a comparative statement of major and minor produce extracted departmentally during two years 1931-32 and 1930-31 .—

Circle	Year	Major Forest Produce			
		Timber cft in thousands	Fuel cft. in thousands	Total cft. in thousands	Sandal-wood value
					Rs.
Northern	1931 32 ..	425	513	938	
	1930 31 .	496	419	915	237
Central	1931-32	16	458	474	4,747
	1930 31 .	5	544	549	778
Southern . ..	1931-32 ..	931	6	937	1,28,467
	1930 31	1,089	4	1,093	99,987
Sind	1931-32 ..	6	314	320	..
	1930-31 ..	4	203	207	
Total ..	1931-32 ..	1,378	1,291	2,669	1,33,214
	1930-31 ..	1,594	1,170	2,764	1,01,002
Difference		−216	+121	−95	+32,212
Percentage of total out-turn from all sources.		20	3	5	100

Circle	Year	Minor Forest Produce			
		Bamboos value	Grass and grazing value	Other value	Total value
		Rs.	Rs.	Rs	Rs.
Northern	1931-32 ..	38	..	18	56
	1930-31 ..	39	..	49	88
Central	1931-32 ..	..	..	5,717	5,717
	1930 31 ..	14	..	10,219	10,233
Southern	1931-32 ..	..	..	133	133
	1930 31 ..	7	..	176	183
Sind	1931-32 ..	..	..	935	935
	1930-31 ..	..	..	141	141
Total	1931-32 .	38	..	6,803	6,841
	1930-31 ..	60	..	10,585	10,645
Difference		−22	..	−3,782	−3,804
Percentage of total out-turn from all sources.		..	..	4	·4

The decrease under timber in the Northern Circle is due partly to the closure of the Haste saw mill in the West Nasik Division and partly to the fact that the thinning coupes containing old standards in the North Thana Division were sold standing instead of being worked departmentally as heretofore. The increase under fuel is due to the departmental working of several thinning coupes in the East and West Thana Divisions owing to their remoteness from the market and the poor quality of material to be cut.

In the Central Circle the increase under timber is due to the exploitation of a teak coupe in the Yawal Range of the East Khandesh Division. The decrease under fuel is due to non-exploitation of coupes for the Matheran depot as the stock of fuel in hand at the depot was sufficient for the requirements of the station. The increase under sandalwood is due to more trees having been exploited from malki lands. The decrease under other minor produce is due to the fact that in 1930-31 revenue for 2 years was recovered.

The decrease in the outturn of timber in the Southern Circle is due to extraction of less quantity owing to large stocks on hand in sale depots. The increase in the quantity of fuel is due to the extra quantity supplied to the Foden Mill for consumption throughout the year as against only 9 months during the previous year and also to the supply made to Dandeli saw mill for a part of the year. Though the quantity of sandalwood exploited was less than the previous year, the revenue realised by its sale was more owing to better prices.

In the Sind Circle the increase under timber is due to *babul* timber having been supplied to the Gun Carriage Factory, Jubbulpore. The increase in the outturn of fuel is due to departmental felhngs having been carried out in the Karachi Division in areas for which purchasers did not offer reasonable prices.

Timber Depots.—The average prices realized at the annual depot sales in the Northern and Southern Circles are compared in the following tables :—

Northern Circle.

Kind of timber	Average rate per khandi of 12 50 cft					
	Waghai Depot (Chikhalda and Sundha mills)		Nasik Depot (Badgi mill)		Nasik Depot (Haste mill)	
	1931-32	1930-31	1931-32	1930-31	1931-32	1930-31
	Rs a p	Rs a p	Rs a p	Rs a p	Rs a p	Rs a p
Boards	20 0 10	19 14 9		19 11 7	19 1 2	18 10 11
Battens	15 14 2	13 0 4			14 7 3	10 6 8
Scantlings	19 4 4	20 5 0	31 7 1	23 5 11	24 9 9	23 12 2

Southern Circle.

Kind of timber	Average rate per khandi of 12·50 cft.			
	Dandeli above ghat depot		Kodibag Depot	
	1931-32	1930-31	1931-32	1930-31
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Teak	23 11 11	26 15 3	22 15 8	27 1 3
Matti	13 5 8	17 4 0	15 1 0	20 15 5
Nana	13 8 6	20 9 9	..	....
Honne	14 10 1	19 12 0	14 13 11	21 6 1
Sissum	14 15 7	19 0 6	21 6 10	25 10 10
Kharsing	....	....	....	....
Karimuttal	13 11 6	17 5 0	....	....
Heddi	11 1 2	12 8 0	....	....
Other junglewood	10 15 7	15 0 6	....	....
Teak Scantlings	24 13 11	31 1 11	....	....
Teak planks	32 13 0	39 12 5	....	....
Teak battens	19 13 8	20 12 3	....	....

Kind of timber	Average rate per khandi of 12·50 cft.			
	Hattikeri Depot		Kirwatti Depot	
	1931-32	1930-31	1931-32	1930-31
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Teak	23 3 3	23 4 9	16 15 7	18 0 0
Matti	16 8 0	19 4 3	10 15 6	7 2 4
Nana	....	....	13 2 3	6 8 0
Honne	15 0 0	16 9 6	12 4 10	9 0 9
Sissum	15 14 3	24 4 9	....	....
Kharsing	....	15 2 3	....	....
Karimuttal	....	....	14 8 8	12 12 0
Heddi	....	....	8 10 1	9 6 5
Other junglewood	....	....	....	....
Teak Scantlings	....	....	24 0 4	27 4 5
Teak planks	....	....	26 2 9	32 15 1
Teak battens	....	....	15 8 11	20 9 2

There has not been any appreciable improvement in the prices obtained in the Northern Circle. In the Southern Circle owing to the general trade depression there was a heavy drop in the prices of timber in all divisions except Eastern Division Kanara where prices realised for *matti*, *honne* and *karimuttal* were better than those of the previous year but much less than those realised in 1929-30. As the Nasik market cannot absorb the full outturn of even one mill, the mill at Haste was closed down from 1st November 1931. The coupes in the West Nasik Division are now sold standing.

Firewood depots.—All fuel depots in the Northern Circle and in Kanara were worked by contractors. For the Mahableshwar and Panchgani fuel depots coupes were worked departmentally and the extracted material removed to the depots, which were then operated through contractors. The former until the end of November 1931 and the latter for the whole year. The former depot was managed departmentally after the expiry of the contract period until the end of the year.

Mechanical extraction and transport of timber and Government saw mills are dealt with in Chapter IV A.

Private saw mills.—The private saw mill in Eastern Division Kanara belonging to Mr. Sayad Nasrodin Hassansab turned out 8,187 sleepers and 2,461 cft. of sawn material as compared with 9,589 sleepers and 1,789 cft. of sawn material in the previous year.

Cart Depots.—The cart depot at Kirwatti was abolished with effect from 1st April 1931 as per Government Resolution, Revenue Department, No. 28 A.D. of 26th March 1931.

Messrs. Howard Brothers Timber Agency.—The account with this Firm to the end of the financial year is given below :—

Description of timber.	Receipts.	Disposals.	Balance in stock.	Sale proceeds.
	Cft.	Cft.		£ s. d.
Teak	22,616	22,616	..	13,516 17 6
Matti	11,419	11,419	..	
Blackwood or rosewood ..	t. c. q. lbs.	t. c. q. lbs.	..	
	29 4 3 3	29 4 3 3		
	Cft.	Cft.		
Honne	78	78	..	

Description of timber.	All charges on sales.	Other charges, freight charges etc.	Net proceeds.
	£ s. d.	£ s. d.	£ s. d.
Teak	2,100 13 11	6,820 17 8	4,595 5 11
Matti			
Blackwood or rosewood ..			
Honne			

No shipments of timber were made to this Firm during the year.

Efforts to open up a market for teak sawn wood in South Africa, through Messrs. Rhodesian Timbers Limited have not been successful owing to the high standard of quality and specifications which this firm requires. The supply could only be made by conversion of the highest class logs and these can always find a more advantageous market in this country.

At the instance of Messrs. Mallinson and Sons Ltd., London, a sample consignment of 10 tons of teak in square edged boards and planks was shipped to London. But in this case also the quality and the texture of the sample shipment were not sufficiently high and no further business resulted.

(*ii*) *Purchasers.*

The following table compares the outturn of major and minor produce removed by consumers and purchasers during the years 1931-32 and 1930-31 :—

Circle.	Year.	Major Forest Produce.				
		Timber.		Fuel.		Sandal-wood Value.
		Cft. in thou-sands.	Value.	Cft. in thou-sands.	Value.	
			Rs.		Rs.	Rs.
Northern	1931-32 .	2,523	13,19,424	6,695	24,963	..
	1930-31 ..	1,835	9,03,626	5,603	21,346	..
Central	1931-32 .	1,052	2,96,995	8,452	53,964	..
	1930-31 ..	463	1,66,184	2,818	68,570	2,615
Southern	1931-32 ..	1,243	2,52,134	5,281	1,52,111	..
	1930-31 ..	1,425	2,33,184	8,223	1,87,574	..
Sind	1931-32 ..	250	48,829	16,165	2,56,384	..
	1930-31 ..	110	57,763	12,102	2,97,420	..
Total	1931-32 ..	5,068	19,17,382	36,593	4,87,422	..
	1930-31 ..	3,833	13,60,757	28,746	5,74,910	2,615
Difference..		+1,235	+5,56,625	+7,847	−87,488	−2,615

Circle.	Year.	Minor Forest Produce.			
		Bamboos value.	Grass and grazing value.	Other minor produce value.	Total value.
		Rs.	Rs.	Rs.	Rs.
Northern	1931-32 ..	63,193	1,35,266	32,895	2,31,354
	1930-31 ..	55,651	1,12,906	32,448	2,01,005
Central	1931-32 ..	14,016	3,88,152	34,561	4,36,729
	1930-31 ..	13,989	4,11,269	42,957	4,68,215
Southern	1931-32 ..	67,612	89,548	53,159	2,10,319
	1930-31 .	71,134	81,577	59,125	2,11,836
Sind	1931-32 ..	....	42,521	14,650	57,171
	1930-31 .	....	41,132	18,070	59,202
Total	1931-32 ..	1,44,821	6,55,487	1,35,265	9,35,573
	1930-31 ..	1,40,774	6,46,884	1,52,600	9,40,258
Difference ..		+4,047	+8,603	−17,335	−4,685

Northern Circle.—Causes for the increases in the outturn and value of both timber and fuel are (1) most of the coupes remaining unsold during 1930-31 owing to the disturbed state caused by the Civil Disobedience Movement, were sold during the year along with current coupes, (2) slight improvement in the timber market as compared with the previous year, and (3) old standards in North Thana were sold standing, instead of being worked departmentally. Greater demand for bamboos in the Surat Division accounts for the increase under the head. Reasons for the increase under grass and grazing are (1) the grass areas hitherto worked for storage of famine fodder in Thana and Panch Mahals were sold during the year owing to curtailment of the famine fodder storage scheme and (2) a larger number of outside cattle were brought to forest for grazing than in the previous year.

Central Circle.—The increase in the value of timber and fuel together, which amounts to Rs. 1,16,205 is due to better prices obtained for coupes in the West Khandesh and Kolaba Divisions and also to more coupes being sold during the year. The decrease under grass and grazing is chiefly due to timely recovery of grazing fees at normal rates instead of at penal rates in the previous year. The decrease under other minor produce is due to low prices obtained for *hirda* and *shikekai* in the Satara Division owing to bad trade conditions.

Southern Circle.—The increase in the value of timber is due to better prices being obtained for teak pole coupes in Kanara Eastern Division

and Belgaum while the decrease in the outturn is due to smaller quantities being extracted by contractors. Many of the fuel coupes remained unsold in Kanara Southern Division and Dharwar-Bijapur Division and this accounts for the decrease under fuel. Recovery of arrear grazing fees has resulted in an increase under grass and grazing. The decrease under bamboos and other minor produce is due to trade depression.

Sind Circle.—Increase in the quantity of timber is due to several causes, viz. (1) thinnings carried out in young *tali* plantations, (2) exploitation of a standing *bahan* (*Populus euphratica*) coupe and (3) supply of timber to the Gun Carriage Factory at Jubbulpore. The decrease in the value of timber is due partly to the inferior quality of material obtained from *tali* thinnings and to non-sale of some coupes in the Karachi Division. The increase in the outturn of fuel is due to the extraction of more dead wood during the year and the decrease in value is due to the poorer quality of the coupes offered for sale. The increase under grass and grazing is due to the larger number of cattle registered. The decrease under other minor produce is due to the low prices received for *sar* reed and *kanh* grass (*Sacharum spp*).

(*iii*) *Rights, Privileges and Free Grants.*

The following is a comparative statement of the quantity and value of forest produce removed by right and privilege holders and free grantees during the years 1931-32 and 1930-31 :—

Circle.	Agency.	Major Forest Produce.				Minor Forest Produce.			
		Timber.		Fuel.		Bamboos value.	Grass and grazing value.	Other minor produce value.	Total value.
		Cft. in thousands.	Value	Cft. in thousands.	Value.				
			Rs.	Rs	Rs.	Rs.	Rs.	Rs.	Rs.
Northern	C	18	1,139	4,473	98,960	4,784	5,06,259	14,774	5,25,817
	F	12	5,581	4	205	153	175	137	465
Central	C	..	..	514	6,784	..	48,966	9,407	58,373
	F	22	9,004	16	1,215	1,362	897	1,493	3,752
Southern	C	305	72,000	3,007	37,500	45,000	2,84,339	20,000	3,49,339
	F	33	7,878	15	187	592	5,303	749	6,644
Sind	C	..	..	5	102	..	7,184	..	7,184
	F	27	3,517	2	30	.	14,696	215	14,911
Total of 1931-32.	C	323	73,139	7,999	1,43,346	49,784	8,46,748	44,181	9,40,713
	F	94	25,980	37	1,637	2,107	21,071	2,594	25,772
Total of 1930-31.	C	328	73,750	8,147	1,63,605	50,038	7,78,679	40,010	8,68,727
	F	131	37,297	75	3,270	1,847	20,133	2,674	24,654

C = Concessionists. F = Freegrantees.

There are no rights except those of way Privileges are regulated by local rules and orders and these were exercised by villagers as usual in all Circles Under Government Resolution, Revenue Department, No 7236/28, dated 1st March 1932 the privilege of collecting lac, granted to forest villagers in the Panch Mahals, East Nasik and Surat Divisions, was withdrawn The withdrawal of this privilege has not caused any hardship as there is no natural lac in any of the forests Its continuance would however have adversely affected the results of experiments in the propagation of lac which are at present being carried out

Free grants of timber and other produce were given in deserving cases for construction and repair of dwellings, and for other domestic and agricultural purposes A grant of 12 khandies of teak wood was made from Dandeli depôt to the District Local Board, Belgaum, for carpentry classes

A free grant of timber of the value of Rs 2,000 has been sanctioned in Government Resolution, Revenue Department, No. 6591/28, dated 27th April 1931 to the Trustees of the Lord Reay Industrial Museum, Poona, from the timber depôts in the Southern Circle subject to the condition that the cost of collection and transport and other incidental charges should be borne by them The Trustees have not yet taken delivery of the timber and have asked that part of the timber be given to them in the form of prepared specimens for exhibition in the Museum and arrangements to supply these are in progress

(c) Outturn and Sources of Forest Produce

The outturn from all sources of forest produce during the two years 1931-32 and 1930 31 compares as follows —

Circle	Year	Major Forest Produce			Minor Forest Produce		
		Timber C ft in thousands	Fuel C ft in thousands	Sandal wood	Bamboos	Grass and grazing	Othe minor produce
				Rs	Rs	Rs	Rs
Northern	1931 32	2 978	11 685		68 168	6 41,700	47 824
	1930 31	2 370	10 633	237	60 809	5 46 199	41,556
Central	1931 32	1 090	9 440	4 747	15 378	4 38 015	51 178
	1930 31	496	3 924	3,303	15 336	4 67,775	66 382
Southern	1931 32	2 512	8 309	1,28 467	1 13 204	3 79 190	74 041
	1930 31	2 859	11 264	99 987	1,16 574	3 69,168	79 720
Sind	1931 32	283	16 486			64 401	15,800
	1930 31	161	12 317			62 048	18 717
Total	1931 32	6 863	45 920	1 33 214	1 96 750	15 23 806	1 88 843
	1930 31	5 886	38,138	1 03 617	1 92 719	14 45,190	2 06,375
Difference		+977	+7 782	+29 597	+4 031	+78 116	−17 532

The expenditure on management of State Forest was :—

Circle	1931-32	1930-31
	Rs.	Rs.
Northern	2,66,142	3,67,226
Central	65,444	1,00,037
Southern	11,86,418	11,45,955
Sind	26,350	35,500
Total ..	15,44,354	16,48,718

The decrease is chiefly due to less expenditure on communications and buildings in all circles, the increase in the Southern Circle being due to payments made to contractors for work done during the previous year.

CHAPTER IV-A.

FOREST ENGINEERING BRANCH.

The urgent need for retrenchment in expenditure limited the activities of the Forest Engineer and his staff to works of absolute necessity. The work done during the year is briefly described below :-

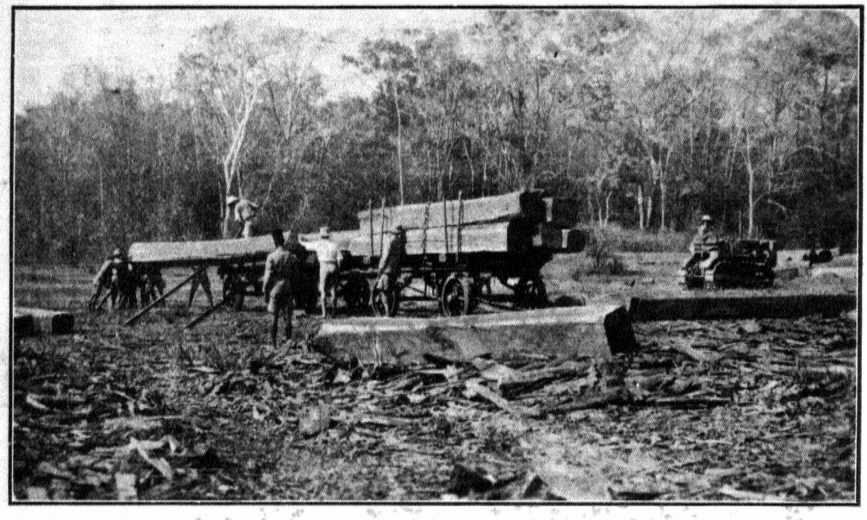
1. Surveys.

The survey of the Ozar-Saiwan road in the West Nasik division of the Northern Circle was completed and the preparation of plans, longitudinal sections and estimates has been taken in hand. In the Southern Circle the possibility of reopening the old Holigadde timber slide with a view to reducing the cost of extraction in the Gund Range was investigated by the Forest Engineer under instructions from the Conservator of Forests, Southern Circle. Trials with a specially designed drum and an endless cable to control the descent of the logs were made with promising results, and it has been decided to reopen this slide next season.

2. Designs and Drawing Work.

New designs are constanly being produced in order to meet the present financial conditions. A saving of nearly 40 per cent. has already been made by use of a modification of the Standard Type Design Culvert. This year fresh plans have been drawn up for Forest buildings using asbestos-cement sheets in lieu of masonry. This, besides rendering it unnecessary to import expensive skilled labour into out-of-the way places, results in a very considerable saving in cost over the ordinary Standard design. Buildings to the new specification are due for erection shortly in Western Division Kanara.

As hitherto, in addition to checking and scrutinizing plans and estimates submitted by Divisional Officers, the Engineering Branch supplied standard and special plans with properly drawn up estimates whenever called upon to do so.



Experimental work with a 30 Caterpillar Tractor in N. D. Kanara.
Loading logs on to the trailers.

Experimental work with a 30 Caterpillar Tractor in N. D. Kanara.
Caterpillar snaking logs.

3. Construction.

(*a*) *Roads.*—The following construction work and repairs were carried out :—

		Rs.	a.	p.
1.	Part construction of the Birkhol bridge ..	3,500	0	0
2.	Current repairs to (1) culverts on the Kadra-Shivpur Road ..	332	8	0
	(2) the Tamangi ghat Road.	617	8	0
	(3) the old Birkhol bridge.	200	0	0

The new bridge over the Birkhol nala in Western Division Kanara will be completed during the ensuing year, and repairs to the old bridge will cease. For want of funds the remodelling of culverts on the Kadra-Shivpur road had to be postponed.

(*b*) *Buildings.*—No new buildings were constructed. Repairs to the quarters of the Engineering staff, the stores shed and reservoir at Dandeli were carried out at a total cost of Rs. 552-5-0.

4. Forest Exploitation.

(*a*) *Mechanical extraction.*

(*i*) *Fordson outfit.*—One outfit working from 18th November 1931 to 15th April 1932 completed the extraction work in compartment XXV of the Nagzhiri Valley. The total output during the year was 571·94 tons against 642·80 tons last year, the all-in working costs being Rs. 14-13-0 per ton against Rs. 13-8-0 per ton last year. The increase is attributed to reduced output and greater average length of haul which was 1,306 feet as against 1,189 feet last year.

With the second outfit timber extraction from compartments Nos. XIII and XIV on the Kaneri slopes of the Gund Range was continued. The total output aggregated 1,067·23 tons as against 964·72 tons last year, work lasting from the 26th of December 1931 to 8th May 1932.

Working costs including all charges averaged Rs. 7-7-0 per ton with an average length of haul of 1,057 feet as compared with Rs. 8-9-0 per ton with an average haul of 986 feet last year.

(*ii*) *Animal winch.*—This was worked under the direct control of the Sub-Divisional Forest Officer, Exploitation, Northern Division Kanara, in compartment XXV Nagzhiri Valley from November 1931 to April 1932. It extracted a total quantity of 494·56 tons against 439·41 tons last year, the average haul being 626 feet compared with 682 feet last year. Working costs inclusive of all charges came to Rs. 10-2-0 per ton against Rs. 12-12-6 per ton last year.

(*iii*) "*Caterpillar*" *tractor experiments.*—An experimental demonstration of logging, road transport and road repairs by means of a 30 Caterpillar tractor took place in Kanara during April. The object of the tests was to find out whether a Caterpillar tractor is able to compete

successfully with buffaloes and animal transport in logging and extraction operations, and also with manual labour and steam or bullock rollers on road repair works. From a mechanical point of view the Caterpillar was most efficient, particularly in snaking logs over steep and difficult country.

It was thoroughly tested on transport work, including loading and unloading of the logs on trailers; snaking in heavy bamboo forest, and on road grading, and on scarifying and rolling a metalled road.

In every case a very considerable saving over animal haulage was effected. It has to be remembered however that the machine was most skilfully handled by an American expert, and to justify the employment of an expert and thoroughly trained staff, work would have to be provided for the caterpillar for the whole year including the monsoon.

The Department has now experimented with all forms of mechanical transport and the caterpillar with its great power and handiness certainly appears to offer greater possibilities than any other form of machine.

(b) *Sawmilling.*

1. *Preliminary.*—The following sawmills were worked departmentally :—

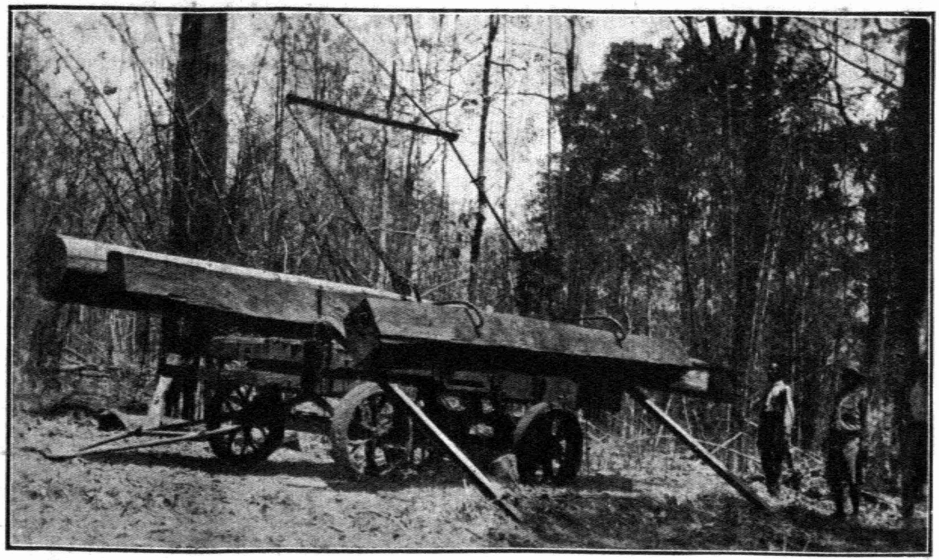
Northern Circle ..	1.	The Dangs sawmill at Sundha.
	2.	The Nasik Sawmill at Haste in Peint (closed down on 1st November 1931).
Southern Circle ..	3.	The Dandeli Mill in Kanara, Northern Division.
	4.	The Foden Portable mill at Bomanhalli in Kanara, Northern Division.
	5.	The Kirwatti mill in Kanara, Eastern Division.
	6.	The Mandurli mill (started on 2nd December 1931) in Kanara, Northern Division.

2. *General.*—The following statement gives the total output and average cost of conversion for the last five years :—

Year	Output of sawn material cft.	Average cost of conversion (stores, labour and establishment charges only).
1927-28 ..	417,480	4·98 annas per cft. of sawn timber.
1928-29 ..	334,753	5·42 annas per cft. of sawn timber.
1929-30 ..	312,453	4·96 annas per cft. of sawn timber.
1930-31 ..	326,450	4·48 annas per cft. of sawn timber.
1931-32 ..	332,616	4·16 annas per cft. of sawn timber.

3. *Deadstock and stores.*—The deadstock of each mill was checked and unserviceable items were either repaired or written off under proper authority. The total value of stores and deadstock supplied to various mills was Rs. 3,139 and 17,649 respectively.

Increase or decrease in number of sawmills.—The year opened and closed with 5 mills working. The Haste Mill was closed on 1st November 1931 and the Mandurli mill opened on 2nd December 1931.



Experimental work with a 30 Caterpillar Tractor in N. D. Kanara.
Caterpillar loading logs by means of cable with spreader and tongs.

Progress of Sawmilling.—The Fowler and American Log Mill was transferred from Dandeli to Mandurli where the lay-out was revised in order to introduce additional machinery thus obviating the annual move of the "Foden" from Bomanhalli to Mandurli. Some saw benches were transferred from the Northern to the Southern Circle consequent on the closing down of the mill at Haste. The transfer to Dandeli of a Robey Portable from the old Badgi mill in the Northern Circle will serve in effecting useful changes at Dandeli and Kirwatti.

Statement A given below shows the outturn and average sawing charges incurred under the head stores, labour and establishment :—

TABLE "A".

Name of Mill	Output during the year in cft.			Average sawing cost in cft. Stores		
	1929-30	1930-31	1931-32	1929-30	1930-31	1931-32
Dandeli Mill ..	127,628	113,466	133,166	1 15	0 92	0·72
Foden Portable ..	25,219	34,446	42,824	1 27	1·28	0·76
Kirwatti Mill ..	39,072	53,337	51,058	1·35	0·72	0·68
*Badgi Mill .	4,980	. ..	....	2·12	....	....
†Haste Mill .	45,553	59,571	30,737	1·53	0·81	0·46
Chikhalda Mill (Sunda Dangs)	70,001	65,630	54,625	1·31	1·22	1·53
‡Mandurli Mill .	....	....	20,206	...	....	0·98
Total for Presidency	312,453	326,450	332,616	1·30	0·94	0·85

Name of Mill	Average sawing cost in cft.—*contd.* Labour			Establishment			Total excluding overhead charges		
	1929-30	1930-31	1931-32	1929-30	1930-31	1931-32	1929-30	1930-31	1931-32
Dandeli Mill .	3·61	3·78	3·09	0·45	0·61	0·51	5·21	5·31	4·32
Foden Portable ..	2·47	2·33	1·84	1·15	1 02	0·82	4·89	4·63	3·42
Kirwatti Mill ..	2·75	2·45	2·88	0·83	0·47	0·43	4·93	3 64	3·99
*Badgi Mill ..	3·20	..	..	1·24	..	..	6·56	..	..
†Haste Mill	2·05	1·80	2·21	0·80	0·56	0 49	4·38	3·17	3 16
Chikhalda Mill (Sunda Dangs).	2 57	2 83	2·95	0 90	0 90	1·03	4·78	4·95	5 51
‡Mandurli Mill ..	..	..	1 65	..	..	0·38	..	..	3·01
Total for Presidency	2·94	2·86	2·70	0·72	0·68	0·61	4·96	4·48	4·16

*Badgi Mill closed down on 22nd May 1929. †Haste Mill closed down on 1st November 1931.
‡Mandurli mill started on 2nd December 1931.

Organisation.—The revision of the layout of the first half of the Dandeli mill carried out last year having proved a marked success plans for the revision of the second half were prepared but owing to lack of funds it was not possible to proceed with putting them into effect.

Mill Trading Accounts.—The Commercial Audit Department audited the trading accounts of the Dandeli, Kirwatti and Chikhalda (Sundha) sawmills and the stores account of the Forest Engineering Division for the year 1930-31

The following are the trading accounts of the mills worked during the year .—

Trading account of the Sundha Saw-Mill for the year 1931-32.

Capital cost Rs. 66,704 + 65 = 66,769 — 36,874 = 29,895.

Expenditure	Rs	Rs	Income	Rs	Rs
I Timber (unconverted) 110 053 cft at 0 3 0 per cft		20 635	I Sales— Sales of sawn material during the year 24 916 cft	38 277	71,112
II General stores		4,857	*Less*—		
III Establishment		9,873	Stock of sawn material at the end of the previous year 41 312 cft	47,182	
				— 8,905	
IV Labour		5,980			
V Depreciation on capital cost		3,302			
VI Interest on capital cost at 5 86 per cent		4,665	*Add*— Stock of sawn timber at the end of the year 73 484 cft	80,017	
VII Repairs to buildings					
VIII Miscellaneous—			II Miscellaneous receipts		123
(a) General	995				
(b) Carting sawn material to sale depôt	8,754	9 749			
Net profit for the year		12,174			
		71,235			71,235

Trading account of the Haste Saw-Mill for the year 1931-32.

Capital cost Rs. 29,586 — 9,842 = Rs. 19,744.

Expenditure	Rs.	Income	Rs.	Rs.
I. Timber (unconverted) 62,989 cft at 0-6-0 per cft.	23,602	I Sales— Sale of sawn timber 14,118 cft.	26,152	53,872
II. General stores . ..	802			
III. Establishment . ..	1,995	*Less*—		
		Stock of sawn material at the end of the previous year 76,529 cft.	1,01,881	
			—75,729	
IV. Labour .. .	4,245			
V Depreciation on capital cost.	1,434			
VI. Interest on capital cost at 5·86 per cent.	7,156	*Add*—		
		Stock of sawn timber at the end of the year 93,148 cft	1,29,601	
VII. Repairs to buildings ..	..			
VIII. Miscellaneous	32			
IX. Carting sawn material ..	8,017			
Net profit for the year . ..	6,097	II Miscellaneous receipts.		498
	54,370			54,370

Trading account of the Dandeli Saw-Mill for the year 1931-32.

Capital cost Rs. 1,19,770 + 261 — 15,275 = 1,04,756 — 58,742 = 46,014.

Expenditure	Rs.	Income	Rs.	Rs.
I. Timber (unconverted) 177,930 cft.	1,25,130	I. Sales— Sales of sawn material during the year 112,927 cft.	2,55,066	2,66,189
II. General Stores	5,742			
III. Establishment .	30,754	*Less*—		
IV. Labour ..	6,471	Stock of sawn material at the end of the previous year 38,006 cft.	69,875	
			1,85,191	
V. Depreciation on capital cost.	3,679			
VI. Interest on capital at 5 86 per cent.	7,721	*Add*—		
		Stock of sawn timber at the end of the year 58,245 cft.	80,998	
VII. Repairs to buildings	223			
VIII. Miscellaneous ..	6,332			
Net profit for the year ..	81,003	II. Miscellaneous receipts		866
	2,67,055			2,67,055

Trading account of the Foden Portable Saw-Mill for the year 1931-32.

Capital cost Rs. 25,014 + 352 — 4,262 = 21,104 — 11,403 = 9,701.

Expenditure		Rs	Income		Rs	Rs
I	Timber (unconverted) 61,100 cft	19,253	I	Sales— Sale of sawn timber during the year 29,415 cft	55 124	66,759
II	General Stores	2,028				
III	Establishment	7,697		*Less*— Stock of sawn material at the end of the previous year 22,074 cft	23,109	
IV	Labour	799			32,015	
V	Depreciation on capital cost	1,239				
VI	Interest on capital at 5 86 per cent	2,190		*Add*— Stock of sawn timber at the end of the year 35,483 cft	34,744	
VII	Repairs to buildings	685				
VIII	Miscellaneous	2,092				
IX	Carting of sawn material	6,217	II	Miscellaneous receipts		240
Net profit for the year		24,799				
		66,999				66,999

Trading account of the Mandurli Saw-Mill for the year 1931-32.

Capital cost of Rs. 16,194 — 777 = 15,417.

Expenditure		Rs	Income		Rs	Rs
I	Timber (unconverted) 28,632 cft	9,993	I	Sales— Sale of sawn timber during the year		18,254
II	General Stores	1,210				
III	Establishment	2,813				
IV	Labour			*Less*— Stock of sawn material at the end of the previous year		
V	Depreciation on capital cost	777				
VI	Interest on capital at 5 86 per cent.			*Add*— Stock of sawn timber at the end of the year 20,206 cft	18,254	
VII	Repairs to buildings	27				
VIII	Carting of sawn material	1,838				
IX	Miscellaneous	1,596				
Profit for the year						
		18,254				18,254

Trading account of the Kirwatti Saw-Mill for the year 1931-32.

Capital cost Rs. 20,744 + 584 = 21,328 — 13,800 = 7,528.

Expenditure	Rs.	Income	Rs	Rs.
I. Timber (unconverted) 94,773 cft	35,050	I. Sales—		81,725
II. General stores	2,151	Sale of sawn timber during the year 44,806 cft	77,192	
III Establishment	11,888			
IV. Labour	149			
V. Depreciation on capital cost	947	*Less*— Stock of sawn timber at the end of the previous year 19,781 cft.	24,830	
			52,362	
VI Interest on capital at 5·86 per cent.	1,920			
VII Repairs to buildings ..	876			
VIII. Miscellaneous ..	3,653			
Net profit for the year ..	25,994	*Add*— Stock of sawn timber at the end of the year 26,846 cft.	29,363	
		II. Miscellaneous receipts		903
	82,628			82,628

The saw-mills on the whole show a net profit of Rs. 1,50,967 as against Rs. 1,13,374 last year. The mills in the Northern Circle together show a profit of Rs. 19,171 against a loss of Rs. 13,280 sustained last year, while those in the Southern Circle show an increase of Rs. 5,142 over the profits earned last year. Owing to trade depression and consequent fall in sale prices the financial results, though showing some improvement, are considerably less satisfactory than they would be under normal conditions.

CHAPTER V.

FINANCIAL RESULTS.

(Forms Nos. 68, 69 and 70.)

The revenue and expenditure of the year compare with those of the last year and average of the previous quinquennium 1926-27 to 1930-31 as follows :—

Circle	Year	Revenue	Expenditure				Surplus or deficit	Percentage of surplus to gross revenue
			Conservancy, Maintenance and Regeneration	Forest Capital Outlay	Establishment	Total		
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
Northern ..	1931-32	19,51,510	2,58,749	35,552	6,93,841	9,88,142	9,63,368	49·4
	1930-31	13,91,513	2,97,624	99,141	7,25,361	11,22,126	2,69,387	19·4
	Average	23,59,637	3,74,213	1,26,200	6,88,856	11,89,269	11,70,368	49·6
Central ..	1931-32	9,56,308	72,284	2,247	5,75,671	6,50,202	3,06,106	31·3
	1930-31	8,91,320	88,603	20,936	5,97,174	7,06,713	1,84,607	20·7
	Average	11,55,090	1,04,258	31,116	5,87,591	7,22,965	4,32,125	38·3
Southern ..	1931-32	23,39,930	11,69,722	16,912	6,12,257	17,98,891	5,41,039	23·1
	1930-31	23,72,805	11,00,019	46,016	6,44,960	17,90,995	5,81,810	24·5
	Average	29,24,911	10,71,772	58,618	6,28,220	17,58,610	11,66,301	39·9
Sind ..	1931-32	4,25,602	23,275	3,075	3,00,577	3,26,927	98,675	23·4
	1930-31	5,67,519	27,920	7,580	3,21,152	3,56,652	2,10,867	37·2
	Average	6,62,182	73,546	5,216	3,02,968	3,81,730	2,80,452	42·4
General Direction.	1931-32	15	(a) 1,23,955	200	(b) 85,321	2,09,476	—2,09,461	..
	1930-31	8	1,07,742	..	83,299	1,91,041	—1,91,033	..
	Average	21	66,772	51	94,986	1,61,809	—1,61,788	..
Forest Engineering.	1931-32	482	36,448	..	56,696	93,144	—92,662	..
	1930-31	335	26,510	2,197	48,841	77,548	—77,213	..
	Average	1,327	38,486	—2,849	53,563	89,200	—87,873	..
Total Presidency.	1931-32	56,73,847	16,84,433	57,986	23,24,363	40,66,782	16,07,065	28·3
	1930-31	52,23,500	16,48,418	1,75,870	24,20,787	42,45,075	9,78,425	18·7
	Average	71,03,168	17,29,047	2,18,352	23,56,184	43,03,583	27,99,585	39·4
Difference between.	1931-32 and 1930-31	+4,50,347	+36,015	—1,17,884	—96,424	—1,78,293	+6,28,640	..

N.B.—The above figures are exclusive of expenditure under B-V—Famine Fodder charges and B-VIa—work advances as the former expenditure is to be met from the Famine Relief Fund and the latter expenditure is recoverable.

(*a*) Includes Rs. 1,23,808 on account of interest on past Forest Capital Outlay.

(*b*) Includes Rs. 781 on account of loss by exchange.

The gross revenue of the year rose by Rs. 4,50,347 over the figure of the previous year but was less by Rs. 14,29,321 than the average of the preceding five years. The surplus shows an increase as compared with the previous year but is less than the average of the previous quinquennium by Rs. 11,92,520. The increase is shared by the Northern and Central Circles but is partly counter-balanced by a decrease in the Southern and Sind Circles. Although the financial results are distinctly more favourable than in the previous year, the revenue realized is much below normal. There are however indications that a gradual improvement will take place.

The increase in the Northern Circle over the previous year's figure is chiefly due to the sale of arrear coupes which remained unsold in 1930-31 owing to political unrest. More satisfactory prices than last year were obtained for coupes and Revenue Waste Numbers in the Central Circle and this accounts for the increase in that Circle. The decrease in the Southern Circle is mainly due to large stocks of timber at the Dandeli and Hattikeri depôts remaining unsold, the cause at Dandeli being trade depression and at Hattikeri partly bad trade and partly interference with the February Sales by the local Congress agitators. The depression has also led to a drop in prices for coupes in the Belgaum and Dharwar-Bijapur Divisions and to the non-sale of a large number of coupes in the latter Division. Low realizations from coupes owing to the congested state of the fuel market and lack of outside demand for fuel already in stock with contractors are the main causes for the decrease in the Sind Circle.

On the whole there has been a small increase in expenditure under B-Conservancy, Maintenance and Regeneration as compared with the previous year. The increase is shared by the Southern Circle, the General Direction Division and the Forest Engineering Branch and is partly counterbalanced by decreases in other Circles. Payments made to contractors in Kanara Northern Division for works done in 1930-31 in which year funds were not available, account for the increase in the Southern Circle. The increase in the General Direction Division is due to interest on forest capital outlay rising from Rs. 1,07,742 to Rs. 1,23,955 and that in the Forest Engineering Branch to purchase of articles for erection of a mill at Mandurli and transport of a saw mill Engine from the Northern Circle to Dandeli.

Expenditure under 52-A Forest Capital Outlay was heavily curtailed by postponing works and restricting expenditure to urgent items only. The amount spent during the year was only Rs. 57,986 as against Rs. 1,75,870 in the previous year.

The decrease under C-Establishment is principally due to savings effected by the 10 per cent. emergency cut in pay of Government servants and by reduction in the rates of permanent travelling allowance drawn by Foresters and Forester-Surveyors.

The sources of revenue are analysed and compared below :—

Sources and heads	General Direction	Forest Engineering	Northern Circle	Central Circle
REVENUE.	Rs.	Rs.	Rs.	Rs.
Ia and IIa.—Timber ..	....	....	15,37,406	3,02,527
Ib and IIb.—Firewood ..	....	....	26,034	76,194
Ic and IIc—Bamboos ..	....	....	63,232	14,016
Id.—Sandalwood	....	....	....	4,703
IId.—Grazing and grass ..	....	....	1,35,265	3,88,153
Ie and IIe.—Other produce ..	....	....	32,913	40,278
III.—Drift and confiscated forest produce.	....	....	75	2,042
IV.—Forests not managed by Government.	....	....	3,903	23,441
V.—Miscellaneous ..	15	482	1,55,133	1,25,206
Refunds	....	....	—2,451	—20,252
Total ..	15	482	19,51,510	9,56,308

Southern Circle	Sind Circle	Total		Increase or decrease
		1931-32	1930-31	
Rs.	Rs	Rs	Rs	Rs.
17,73,092	54,327	36,67,352	30,87,375	+5,79,977
1,42,208	2,60,552	5,04,988	6,29,640	−1,24,652
67,587	....	1,44,835	1,40,814	+4,021
1,28,417	....	1,33,120	1,27,734	+5,386
89,548	41,955	6,54,921	6,47,671	+7,250
59,954	16,151	1,49,296	1,55,334	−6,038
349	603	3,069	2,286	+783
8		27,352	23,252	+4,100
85,638	62,633	4,29,107	4,30,140	−1,033
−6,871	−10,619	−40,193	−20,746	−19,447
23,39,930	4,25,602	56,73,847	52,23,500	+4,50,347

The heads of expenditure are analysed and compared below :—

Sources and heads	General Direction	Forest Engineering	Northern Circle	Central Circle
1	2	3	4	5
	Rs.	Rs.	Rs.	Rs.
EXPENDITURE.				
B.—Conservancy, Maintenance and Regeneration, etc.				
52-A—*Capital Outlay on Forests.*				
I. Timber, etc., extracted by Government Agency.	..	8,707	1,11,056	13,430
II. Timber, etc., extracted by consumers or purchasers.	..	..	27,794	12,216
III. Maintenance, Repairs and Renewals.	273	27,397	59,160	12,920
52-AIII, 52-AIV and 52-AV. IV. Conservancy and Regeneration 52-A-I and II.	..	..	51,658	14,787
V. Miscellaneous ..	74	344	44,633	21,178
Interest	1,23,808	..	....	....
Total ..	1,24,155	36,448	2,94,301	74,531
C— ESTABLISHMENT.				
I. Pay of Officers	38,843	16,945	1,28,635	95,165
II. Pay of Establishment ..	12,049	23,192	4,53,594	3,92,133
III. Allowances	25,352	13,421	91,581	76,143
IV. Contingencies	1,564	3,138	20,031	13,761
V. Establishment charges payable to Central Government.	6,732	..	....	....
Recoveries from Raisingpur Estate	..	..	....	—1,531
Loss by Exchange	781	..	....	....
Total ..	85,321	56,696	6,93,841	5,75,671
Grand Total ..	2,09,476	93,144	9,88,142	6,50,202
Surplus, 1931-32	—2,09,461	—92,662	+9,63 368	+3,06,106
Surplus, 1930-31	—1,91,033	—77,213	+2,69,387	+1,84,607
Difference	—18,428	—15,449	+6,93,981	+1,21,499

Southern Circle	Sind Circle	Total		Increase or decrease
		1931-32	1930-31	
6	7	8	9	10
Rs.	Rs.	Rs.	Rs.	Rs
10,23,043	7,994	11,64,230	11,18,328	+45,902
4,696	554	45,260	57,692	−12,432
96,380	9,275	2,05,405	3,25,455	−1,20,050
51,187	3,875	1,21 507	1 39,371	−17,864
11,328	4,652	82,209	75,867	+ 6,342
....	....	1,23,808	1,07,575	+16,233
11,86,634	26,350	17,42,419	18,24,288	−81,869
1,14,997	71,197	4,65,782	4,91,970	−26,188
4,02,901	1,63,770	14,47,639	14,63,551	−15,912
78,875	49,139	3,34,511	3,81,376	−46,865
15,484	16,471	70,449	77,139	−6,690
....	....	6,732	6,850	−118
....	....	−1,531	−1,500	−31
....	....	781	1,401	−620
6,12,257	3,00,577	23,24,363	24,20,787	−96,424
17,98,891	3,26,927	40,66,782	42,45,075	−1,78,293
+5,41,039	+98,675	+16,07,065	....	....
+5,81,810	+2,10,867	....	+9,78,425	....
−40,771	−1,12,192	....	.....	+6,28,640

The revenue and expenditure are further analysed as follows :—

Class	General Direction and Forest Engineering		Northern Circle		Central Circle	
	Rs.	Per cent	Rs	Per cent.	Rs.	Per cent.
REVENUE.						
Major produce ..	..	..	15,63,440	80	3,83,424	40
Minor produce ..	..	..	2,31,410	12	4,42,447	46
Miscellaneous ..	497	100	1,59,111	8	1,50,689	16
Refunds	..	..	—2,451	.	—20,252	—2
Total ..	497	..	1,951,510	..	9,56,308	..
EXPENDITURE.						
Conservancy, Maintenance and Regeneration and 52-A.						
Extension and constitution ..	..	..	..	..	..	..
Improvement ..	1,383	1	1,08,345	37	26,292	35
Exploitation	34,994	22	1,70,216	58	36,147	49
Miscellaneous	418	..	15,740	5	12,092	16
Interest	1,23,808	77	..	..	..	..
Total ..	1,60,603	..	2,94,301	..	74,531	..
ESTABLISHMENT.						
Administrative	63,906	45	40,251	6	42,591	7
Executive	56,696	40	2,12,645	31	1,78,038	31
Protective	21,415	15	4,40,945	63	3,55,042	62
Total ..	1,42,017	..	6,93,841	..	5,75,671	..

Class	Southern Circle		Sind Circle		Total	
	Rs.	Per cent.	Rs.	Per cent.	Rs.	Per cent.
REVENUE.						
Major produce	20,43,717	87	3,14,879	74	43,05,460	76
Minor produce	2,17,089	9	58,106	13	9,49,052	17
Miscellaneous	85,995	4	63,236	15	4,59,528	8
Refunds	−6,871	..	−10,619	−2	−40,193	−1
Total ..	23,39,930	..	4,25,602	..	56,73,847	..
EXPENDITURE.						
Conservancy, Maintenance and Regeneration and 52-A.						
Extension and constitution ..	176	..	..	..	176	..
Improvement	1,42,990	12	12,376	47	2,91,386	17
Exploitation	10,32,180	87	9,323	35	12,82,860	74
Miscellaneous	11,288	1	4,651	18	44,189	3
Interest	..	..	..	..	1,23,808	6
Total ..	11,86,634	..	26,350	..	17,42,419	..
ESTABLISHMENT.						
Administrative	44,585	7	50,974	17	2,42,307	10
Executive	2,03,481	33	1,17,485	39	7,68,345	33
Protective	3,64,191	60	1,32,118	44	13,13,711	57
Total ..	6,12,257	..	3,00,577	..	23,24,363	..

The expenditure incurred from the provision under 52-A capital outlay on forests, subsequently charged to revenue, is as shown below :—

Heads.	General Direction.	Northern Circle	Central Circle.	Southern Circle.	Sind Circle.	Forest Engineering.	Total.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
I. Forest Surveys ..	..	..	.	..	..	..	..
II. Organization, Improvement and Extension ..	..	1,165	435	2,331	615	..	4,546
III. Communications and buildings ..	..	33,930	1,412	14,326	1,910	..	51,578
IV. Railways and Tramways ..	..	..	..	..	..	..	..
V. Deadstock, Stores, Tools and Plant ..	200	784	400	255	550	..	2,189
Deduct—Receipts and Recoveries on Capital Account .	..	— 327	..	..	..	..	— 327
Total ..	200	35,552	2,247	16,912	3,075	..	57,986

The outstandings on account of revenue at the commencement and close of the year were :—

Circle.	On 1st April 1931.	On 31st March 1932.
	Rs.	Rs.
Northern	1,77,547	30,213
Central	10,010	9,778
Southern	3,28,358	2,46,448
Sind	1,30,625	94,695
Total ..	6,46,540	3,81,134

A sum of Rs. 1,622 was written off under proper authority in the Southern Circle.

The outstandings on account of contractors and disbursers were as follows :—

Circle.	On 1st April 1931.	On 31st March 1932.
	Rs.	Rs.
Northern	4,380	332
Central	34	104
Southern	13,655	10,772
Sind	449	186
Total ..	18,518	11,394

CHAPTER VI.

RESEARCH AND EXPERIMENTS.

The work done and results observed up to date are briefly described below :—

Subject No. 2.—Germination tests of treated teak seed.

(*Divisions—Surat, Kolaba, Belgaum, West Khandesh, Panch Mahals and S. D., Kanara.*)

Teak seed collected in one season from one and the same tree in each of the localities mentioned above was treated in the manner shown below and experiments were taken in hand to determine the merits of each of the methods of treatment :—

(1) Seed soaked and dried alternately 3 times, for a week at a time ;

(2) Seed soaked and dried alternately twice, for a fortnight at a time ; and

(3) Seed weathered in the rains and sown in the year following collection.

The results of seed treated according to methods (1) and (2) above were analysed last year and though the general mean average percentage of germination showed very little difference between the 2 methods of treatment, it was observed that the results obtained in the several divisions, in which the tests were made, varied very widely *inter se.*

This year the results of the experiments made with seed treated according to the third method, owing to differences in the quantity and incidence of rainfall within the season, show such marked variations that they are not strictly comparable with the results obtained from seed artificially treated.

It is impossible from the information collected to draw any conclusion and as there is no particular object in repeating the experiments this investigation has been closed.

Subject No. 4.—Effect of thinning of teak coppice at different ages.

(*Division—East Thana.*)

The four plots laid out last year were maintained and steps were taken to lay out 4 additional plots to bring under observation a complete series of age gradations from 8 to 15 years.

The registers are being drawn up as laid down in the new statistical Code issued by the Forest Research Institute, Dehra Dun.

Subject No. 5.—Effect of different degrees of thinning in teak plantations of different ages.

(Divisions—West Nasik, West Thana and Belgaum.)

Second remeasurements of trees in the established sample plots are to be recorded in 1934.

Subject No. 7.—Annual girth increment of sandal.

(Divisions—Belgaum and Dharwar-Bijapur.)

The second remeasurements of the trees in the 4 plots in the Belgaum Division were carried out in May 1931, and in both divisions the tar bands and tar numbers on the trees were replaced by white bands and number bearing zinc plates in all the 6 plots under observation.

From the measurements recorded up-to-date no deductions of any importance can be made.

Subject No. 8.—Increment of babul *under different degrees of thinning.*

(Division—Hyderabad, Sind.)

The whole of the preliminary work in connection with the thinning of the various sample plots is now complete and the necessary data have been recorded. The working up of these data with a view to calculating the basal areas of all the plots and the volume curves has been taken in hand.

The following is a brief summary of work done up-to-date. There were originally 9 plots—in 3 different localities representing 3 different age classes (i.e. in coupes regenerated in 1921-22, 1919-20 and 1916-17 respectively). A, B and C thinnings have been carried out in each set of 3 plots. An additional plot (No. 8B4) in which no thinnings have been carried out was added last season by the Conservator.

The B and C thinnings were done in 2 and 3 stages respectively a period of 12 months elapsing between the B and C stages.

The original number of trees in plot 8A3 was somewhat smaller than the numbers in 8A1 and 8A2 because this plot suffered much more severely from frost in 1929 than the other plots, several of the trees having been killed outright.

Subject No. 10.—The economic age for cutting bahan (Populus euphratica).

(Division—Shikarpur.)

There is nothing fresh to record.

The felling in the 10 year old crop will take place during the ensuing year.

Subject No. 12.—*Artificial propagation of rosha grass.*

(*Division—West Khandesh,*)

No experiments were carried out during the year.

Subject No. 13.—*Propagation of hirda* (*Terminalia chebula*).

(*Divisions—Poona and Satara.*)

It having been established that *hirda* stands transplanting and that a good percentage of success is obtainable it remained to discover from what source seedlings for transplanting in the forest should be drawn. Experiments were ordered to be carried out with :—

(*i*) one year old natural seedlings,

(*ii*) 1½ months old nursery seedlings,

(*iii*) natural seedlings of the year.

From the results obtained the indications are that natural seedlings of the year are the safest of the three classes to transplant and give promise of a satisfactory percentage of success. Also it is cheaper to use such seedlings, as the expense of making a nursery and watering is obviated.

The so called "one year old" natural seedlings cannot definitely be proved to be of that age. It also appears that natural seedlings are somewhat difficult to find, and for general propagation purposes it is necessary to maintain a nursery to supplement the natural seedling supply. Further experiments to find out the result of using stumps cut from one year old nursery seedlings for transplantation in the forest have been ordered to be undertaken. Stumps from seedlings raised in a nursery during the 1932 monsoon will be cut and planted out in 1933.

Subject No. 16.—*Effect of improvement fellings on diameter growth.*

(*Division—Surat, Dangs.*)

There is nothing fresh to record. The next set of remeasurements and calculations will be made in 1933.

Subject No. 27.—*Reproduction of anjan* (*Hardwickia binata*) *by broadcast sowing, sowing in single plough drills and dibbling in patches in soils prepared according to different methods in closed and open forest.*

(*Division—East Khandesh.*)

The results obtained in open and closed forest run so close that it would appear that *anjan* does as well in either class of forest. It is to be noted that figures of cost were not collected, but as mulching is an expensive item and since it does not materially assist *anjan*, broadcasting after wounding the soil, without mulching the resultant seedlings, would appear to be the cheapest method of raising *anjan* artificially.

Subject No. 28.—*Effect of early burning on sandal growth and regeneration*—(concluded).

(*Locality—Belgaum Division, Khanapur Range.*)

This investigation terminated this year and has shown :—

1. that the fullest sandal regeneration is obtained by complete protection from fire, but,
2. that when soil, climatic and shade conditions are favourable, early burning can be repeated year after year and yet a very satisfactory increase in regeneration may be obtained.

Subject No. 29.—*Value of shrubs as nurses for artificially raised seedlings in scrub forests.*

(*Divisions—East Khandesh, West Khandesh and East Nasik.*)

The experiment has continued to yield quite inconclusive results and it has been decided not to carry it further.

Subject No. 30.—*Artificial propagation of safed musali* (*Chlorophytum tuberosum.*)

(*Division—North Khandesh.*)

The results of 2 years' experiments to discover the best means of propagating *safed musali*, a valuable minor product occurring in North Khandesh, are summarised below :—

1. Planting is more successful than sowing in all but rocky soils ;
2. Ploughing and burning black cotton soil tend to have a beneficial effect on the survival of shoots ;
3. In rocky soil sowing is attended by a fairly satisfactory measure of success.

Subject No. 31.—*To determine which of the following 3 methods tends to produce the maximum improvement in dealing with forked and branchy young teak transplants of seedlings :—*

(1) Cutting back the plants to ground level ;

(2) Carefully pruning the undesirable shoot or shoots ; and

(3) Breaking the top bud of the undesirable shoot or shoots.

(*Division— West Khandesh.*)

Owing to the difficulty of securing the required type of plants this investigation has been abandoned.

Subject No. 32.—To discover whether there exists any correlation between outer girth increment and heartwood increment of sandal.

(*Division—Dharwar-Bijapur.*)

Two plots, one containing 50 trees at Tadas and the other 36 trees in Honkan have been established and initials recorded.

Remeasurements are placed at intervals of 4 years.

Subject No. 33.—The determination of the rate of increment of Sawar (Bombax malabaricum).

(*Division—Panch Mahals.*)

The sample trees under observation were remeasured in April 1931; the figures reported do not give much additional information to that recorded last year. The investigation continues.

Subject No. 34.—Effect of different degrees of thinning in teak plantations of different ages.

(*Divisions—N. D., E. D., S. D. and W. D., Kanara.*)

The trees in the plots laid out last year are to be remeasured at intervals of 5 years.

While renewing the marks on the trees in the plots in N. D., E. D. and S. D., Kanara, it was observed that in S. D. wind storms had caused 8 casualties and in E. D., Kanara, fire appears to have killed 4 trees outright.

Subject No. 35.—Artificial regeneration of sandalwood.

(*Divisions—Belgaum, Satara and Dharwar-Bijapur.*)

In the last year's research report it was recorded that the experiments carried out in the Belgaum Division to discover the best method of raising sandal artificially indicated that :—

(1) dibbling seed gives better results than broadcasting and

(2) the optimum depth for dibbling is half an inch of soil cover.

As inconclusive results were obtained in Satara and Dharwar-Bijapur a repetition was ordered. Reports received show that the trials were vitiated in Satara by heavy and unseasonable rain and in Dharwar-Bijapur by the presence in the area, selected for the experiments, of regeneration sprung from seed and also by damage caused by rats and pigs.

In the Belgaum Division the attempt to raise sandal on a large scale, artificially, in combination with field crops has been very successful and tends to confirm the deductions drawn last year, viz. that dibbling seed half an inch below the ground is a sure method of reproducing sandal.

EXPERIMENTS CONDUCTED UNDER THE CONTROL OF DIVISIONAL FOREST OFFICERS.

Under the control of the Divisional Forest Officer, Working Plans, Central Circle there is a series of sample plots established for checking the results of silvicultural systems in force in certain divisions of the Central Circle. No data of interest have yet been collected.

The general conclusion arrived at in regard to the maintenance under observation of a series of sample plots in the babul areas of the Poona division is that it is almost impossible to thin *Acacia arabica* too drastically so long as it is commenced early and continued at sufficiently close intervals.

Forest Botany.

Special attention was paid during the past year to the possible correlation between the occurrence of different species of grasses and the presence and development of tree species in the open dry mixed deciduous forests of the Deccan. It can now be definitely stated that the occurrence of *Anthisteria ciliata* as a dominant in the grass crop is an indicator of conditions suitable to the introduction and satisfactory growth of all mixed deciduous species including teak; whereas conditions of soil and climate which result in a predominant crop of *Aristida* species and *Andropogan contortus* are unfavourable to any tree growth other than thorn scrub. Excessive continuous grazing is a potent factor in extending the latter type of grass land while intensive intermittent grazing will gradually restore both the quality of the fodder and the potential ability of the soil to produce trees.

Silviculture.

In Satara the experiments aiming at the introduction of Eucalyptus in the Bombala kurans having failed, the attempt is being given up.

In Kanara Eastern Division the experiment of promoting growth of jungle wood with teak has been continued with some success. Sowings of *taikila* (*Cassia tora*) and cosmos round planted groups of teak with the intention of keeping down grass have given very good results.

In Belgaum Division experiments were continued in the propagation of *nim*, *babul*, sandal, *Cassia siamea*, teak and tamarind in the Gujnal and Gokak Ranges by dibbling seed in the charcoal kiln beds in exploited coupes. Germination percentage was—

	Sandal	Babul	Nim	Cassia Siamea	Teak	Tamarind
Gokak Range ..	37	30	37	44	6	..
Gujnal Range ..	20	..	34	21	21	32

Cassia siamea did well. Many of the *babul* trees successfully raised in 1928 and 1929 have died owing to fungus attack.

Eradication of prickly pear.—The Economic Botanist to the Government of Bombay suggested eradication of this pest by introduction of Cochineal insects. This experiment is being tried in the Dharwar and Badami Ranges of the Dharwar-Bijapur Division. The Assistant Professor of Entomology, Poona, supplied some Cactus leaves infected

with Cochineal insects, and these are tied to the leaves of prickly pear bushes where the infection is left to spread. The result is being watched.

Shikarpur Division.—Experiments were carried out in the Rahuja garden, as under, with—

(1) *Gmelina arborea* (*Shivan*);

(2) *Aleurites fordii* (at the request of the Director of Agriculture);

(3) Mulberry (*Morus alba*).

(1) *Gmelina Arborea.*

Seedlings of *Gmelina arborea* of last year (age six months) were transplanted 20′ apart in July 1931. The plants are quite healthy and well established. The maximum height growth of the plants is 6′, the age of the plants being 18 months.

(2) *Aleurites Fordii.*

A few nuts of the above species received from Kew through the Chief Agricultural Officer in Sind, and sown in the Rahuja garden in May 1931 took two months to germinate. The three seedlings that came up, looked quite healthy in the beginning but with the setting in of the cold weather, they began to wither and subsequently died.

(3) *Mulberry.*

As the possibilities of Mulberry for sports goods manufacture are financially very great, experiments with Mulberry seed and cuttings have been started at Rahuja. The objects of the experiments are—

(1) To discover the minimum water supply necessary to keep plants alive during October to April.

(2) Whether "seedlings", "branch cuttings" or "root or shoot cuttings" give the best results.

(3) Whether "shade" is essential for young plants.

(4) Rate of growth under different methods of propagation.

Trenches 1′ × 1′ have been excavated in an area divided into two plots, one of which is under shade. Each of these plots is again sub-divided into three sub-plots: one sub-plot is given 3″ depth of watering twice a month (3½ feet delta), another 3″ depth of watering four times a month (7 feet delta) and the third eight times a month (14 feet delta).

Thirty-two cuttings were planted in each sub-plot on the 22nd March. The results will be reported on in next year's report.

Similarly in six other sub-plots seed will be tried. Arrangements for procuring seed have been made from the Changa Manga and Chichawati plantation in the Punjab.

Hyderabad Division.—An interesting experiment was carried out in the Miani nursery in connection with the raising of Mulberry both from seed and from shoot cuttings Valuable information as to the best time of sowing, treatment of seed and shading was obtained. The main object was to see if this species would thrive in Sind, and this object has been achieved. The experiment is being extended in order to determine the minimum amount of water needed to keep the plants alive, and also in connection with the raising of plants from root and shoot cuttings.

African Babul varieties.

The seedlings referred to in last year's report have grown well but have been very badly depleted in numbers by rats in areas not flooded by river spill. The seedlings were also badly affected by the late frost of February 16th, 1932. They have revived but not as well as the Sindh *babul.*

Teak.

Ninety-three seeds of teak were sown very late in 1931 in the Miani garden. None germinated. It is expected that some may germinate in 1932.

Aleurites Fordii.

Seventy seeds of this species were received from the Chief Agricultural Officer in Sind in May 1931 and were sown in pots. Only four seeds germinated but the seedlings subsequently died.

Karachi Division.—A careful record of the progress of the young plants of the species *Acacia arabica, Var, Adansonii* and *Acacia nilotica,* raised from seed, sown in August 1930, was maintained in the Khathar Range office, and sign boards were fixed in the experimental site in compartment No. 2 of Khatro forest, in order clearly to indicate the species. The result of the sowing reported is that six seedlings of the first named species, of an average height growth of 6′-10½″ and 12 seedlings of the latter species of an average height growth of 10′-5″ are at present surviving.

Experimental and Commercial Activities.

Kanara Northern Division supplied a sample consignment of 10 tons teak scantlings, boards and planks to Messrs. Mallinson and Sons Ltd., Timber and Veneer Merchants, London, with a view to finding a market there. The timber was however pronounced to be cross grained and not up to Europe standard.

As a result of negotiations opened by the Divisional Forest Officer, Dharwar-Bijapur Division, some small business in sandalwood was done direct with a London firm. It is hoped that this may develop.

Experimental Propagation of Lac.

Experiments were continued in the Dharwar and Hangal-Dhundshi Ranges of the Dharwar-Bijapur Division, with the result that the experiment in the latter Range had to be discontinued due to the failure of the lac insect to thrive in this locality. In Dharwar Range the experiment will be continued for another year.

In the North Khandesh and Surat Divisions some *ber* (*Zizyphus jujuba*) and *palas* (*Butea frondosa*) trees were infected with brood lac obtained locally, with some degree of success. The result obtained in North Khandesh on *ber* trees has been encouraging and the best so far obtained.

In the Panch Mahals Division experiments were carried out in the Godhra and Halol Ranges. In the former Range the crop was maintained whereas in the latter the experiment had to be given up owing to very poor results.

Hyderabad Division.—The Range Forest Officer, Hala, carried out an experimental inoculation of *babul* in the Nurketi forest, compartment No. 27, and the result has been very satisfactory. Only three sticks of brood lac were tied on trees favourably situated. These trees became completely infected and eight nearby trees were also infected.

CHAPTER VII.

ADMINISTRATION.

The office of the Chief Conservator of Forests was held by—

Mr. H. L. Newman, C.I.E., from 1st April 1931 to 17th March 1932;
Mr. P. E. Aitchison from 18th March 1932 to 31st March 1932.

The territorial Circles were held by the following officers :—

Northern Circle ..	Mr. R. W. Inder—throughout the year.
Central Circle ..	Mr. A. C. Hiley—throughout the year.
Southern Circle ..	Mr. D. B. Sothers from 1st April 1931 to 27th October 1931.
	Mr. P. E. Aitchison from 28th October 1931 to 14th March 1932.
	Mr. D. B. Sothers from 15th March 1932 to 31st March 1932.
Sind Circle ..	Mr. C. E. L. Gilbert—throughout the year.
Forest Engineering branch	Mr. R. V. Alexander—throughout the year.

Divisional charges were held by officers named below :—

Division.	Name of Officer.	From	To
Panch Mahals	Mr. R. F. Sandeman.	1st April 1931 ..	28th October 1931.
	Mr. S. P. Pandya ..	29th October 1931 ..	31st March 1932.
Surat ..	Mr. E. O. Sampson ..	Throughout the year.	
North Thana ..	Mr. W. de C. Walsh .	Throughout the year.	
East Thana	Rao Saheb G. R. Patkar.	1st April 1931 ..	1st November 1931.
	Mr. R. F. Sandeman.	2nd November 1931	31st March 1932.
West Thana	Mr. R. A. Shirali ..	1st April 1931 ..	12th December 1931.
	Mr. V. A. N. Sausman	13th December 1931 .	31st March 1932.
East Nasik ..	Mr. R. K. Kanitkar.	Throughout the year.	
West Nasik	Mr. S. P. Pandya ..	1st April 1931 ..	8th September 1931.
	Mr. H. P. W. Davis.	9th September 1931 .	31st March 1932.
Working Plans, Northern Circle.	Mr. J. Petty ..	1st April 1931 ..	2nd November 1931.
		Held in abeyance from	3rd November 1931.
Gurcharan Officer, Thana.	Mr. F. X. Saldanha.	Throughout the year.	
East Khandesh	Mr. J. L. Bell ..	1st April 1931 ..	14th May 1931.
	Mr. G. J. Ramchandani.	15th May 1931 ..	2nd November 1931.
	Mr. J. Petty ..	3rd November 1931 .	31st March 1932.
North Khandesh.	Mr. N. C. Ramchandani.	1st April 1931 ..	2nd April 1931.
	Mr. Abdul Rahim ..	3rd April 1931 ..	31st March 1932.
West Khandesh.	Mr. H. C. Holmes ..	1st April 1931 .	2nd April 1931.
	Mr. G. J. Ramchandani.	3rd April 1931 ..	27th April 1931.
	Mr. H. C. Holmes ..	28th April 1931 ..	31st March 1932.
Poona ..	Mr. G. S. Singh ..	Throughout the year.	
Kolaba ..	Mr. E. T. C. Vas ..	Throughout the year.	
Satara ..	Mr. J. A. Singh ..	Throughout the year.	
Working Plans, Central Circle.	Mr. E. A. Garland ..	Throughout the year.	
Kanara, N. D. ..	Mr. S. N. J. Ratnagar.	Throughout the year.	
Kanara, E. D.	Mr. J. Walker ..	1st April 1931 ..	1st July 1931.
	Mr. D. V. Phatak ..	2nd July 1931 ..	16th July 1931.
	Mr. J. Walker ..	17th July 1931 ..	31st March 1932.
Kanara, S. D.	Mr. Y. R. Divekar ..	1st April 1931 ..	17th March 1932.
	Mr. F. A. B. Coelho	18th March 1932 ..	31st March 1932.
Kanara, W. D.	Mr. H. J. C. Millett	1st April 1931 ..	18th March 1932.
	Mr. Y. R. Divekar ..	19th March 1932 ..	31st March 1932.
Belgaum ..	Mr. F. A. B. Coelho	1st April 1931 ..	4th October 1931.
	Mr. D. B. Sothers ..	5th October 1931 ..	16th March 1932.
	Mr. K. V. Mankikar	17th March 1932 ..	31st March 1932.
Dharwar-Bijapur.	Mr. R. J. Smith ..	1st April 1931 ..	21st October 1931
	Mr. H. W. Starte ..	22nd October 1931 ..	31st March 1932.
Working Plans, Southern Circle.	Mr. S. N. Kesarcodi	Throughout the year.	
Sukkur ..	Mr. A. F. Gonsalves	1st April 1931 ..	16th April 1931.
	Mr. N. C. Ramchandani.	17th April 1931 ..	31st March 1932.
Shikarpur ..	Mr. P. J. Rodrigues	1st April 1931 ..	1st March 1932.
	Mr. N. C. Ramchandani.	2nd March 1932 ..	31st March 1932.
Larkana ..	Mr. M. L. Khanna ..	Throughout the year.	
Hyderabad ..	Mr. R. P. Dalley ..	1st April 1931 ..	27th May 1931.
	Mr. C. G. Abichandani.	28th May 1931 ..	26th October 1931.
	Mr. R. P. Dalley ..	27th October 1931 ..	31st March 1932.
Karachi ..	Mr. J. B. Brooks ..	1st April 1931 ..	9th November 1931.
	Mr. E. S. B. Tavener	10th November 1931.	31st March 1932.
Working Plans, Sind Circle.	Mr C. G. Abichandani.	16th December 1931 .	31st March 1932.

Thirteen divisions were held wholly by Imperial officers and officers of Class I of the Bombay Forest Service, 12 partly by Imperial officers and partly by officers of classes I and II and 4 wholly by officers of class II of the latter service.

At the close of the year the number of officers attached to Divisions as Assistants or Sub-Divisional Officers was 9, of whom 2 were Class I officers and 7 Class II officers.

Rao Saheb G. R. Patkar, Deputy Conservator of Forests, retired with effect from 2nd March 1932 after a remarkably creditable career in the Department.

In view of the imperative need for economy the Working Plans Office in the Northern Circle and the West Nasik sub-division were held in abeyance from 2nd November and 20th December 1931 respectively.

At the suggestion of Government the question of combining the East Nasik and West Nasik divisions in the Northern Circle and the Larkana and Shikarpur divisions in the Sind Circle was investigated. As an experiment the East Nasik Division was temporarily abolished as a division and put in charge of a sub-divisional officer under the control of the Divisional Forest Officer, West Nasik. After trying this arrangement for 3 months it was found that it did not result in any practical advantage either by way of increased efficiency or appreciable reduction in expenditure. Similarly reshuffling or linking up of existing forest charges in the Sind Circle was decided against owing to the impending development of the inland forests, particularly in the Larkana Division, which are to be brought under regular plantations with an assured water supply from the Barrage Canals.

Subordinate and Clerical Establishments.

Two new Rangers trained at the Madras Forest College, Coimbatore, joined service during the year. Two new students were selected for the Ranger's Course of 1932–34 and given practical training in the Southern Circle.

The Forest Class in the Northern Circle was again held in abeyance as a measure of economy. In the Southern Circle ten young Foresters and Guards were selected for a special course of training under selected Rangers and of these 8 passed out successfully.

Casualties and Punishments.

Particulars.	General direction.	Northern Circle.	Central Circle.	Southern Circle.	Sind Circle.	Total.	
						1931-32.	1930-31.
1. Retirements ..	..	36	24	25	6	91	68
2. Deaths ..	..	13	8	9	7	37	32
3. Resignations ..	..	13	2	4	3	22	38
4. Degradations ..	..	6	9	18	9	42	25
5. Prosecutions ..	..	..	..	..	..	..	2
6. Dismissals, Removals etc. ..	..	12	13	11	6	42	40
Total ..	..	80	56	67	31	234	205

The staff as usual suffered a good deal from ill-health on account of malaria particularly in Kanara, the Dangs, North Thana and West Nasik.

A case in which a Round Forester in the Poona Division was assaulted was taken to court and all the 6 accused were convicted and sentenced to rigorous imprisonment as well as to pay a fine.

A theft was committed in the house of Round Officer at Shenit in the Rajur Range of the Poona Division and a sum of Rs. 32-12-0 (including Rs. 15-12-0 Government revenue) was stolen. A complaint has been lodged and the enquiry is in progress.

The work of the Rangers and subordinate protective staff and office establishment has been reported to be satisfactory with very few exceptions.

Inspection and Tours.

The Honourable Minister for Agriculture visited Vihe plantation in the Satara District in company with the Collector of Satara.

The Chief Conservator toured in the three Circles of the Presidency and had also made arrangements for a tour in the forests of Sind but was unfortunately prevented from going there owing to serious illness. Divisional and other offices were inspected by the Conservators as usual. No irregularities of a serious nature were noticed except in the case of North Thana where a sum of Rs. 4,050 creditable as revenue was credited to deposit and subsequently refunded to the payee. The amount is under process of recovery.

Civil Suits.

The appeal to the High Court preferred by the Khot of Tise in the Civil Suit, referred to in last year's report is still pending.

The Khots of Gopalwat, Landhar and Tise and co-sharers sued Government for refund of the amount recovered from them on account of loss caused to Government by illicit cutting of trees in their Khoti forests. Of these three cases, two were compromised and the Khots were paid Rs. 1,335 and the third case relating to the Khot of Gopalwat and co-sharers is still pending in the Thana Sub-Judge's Court.

Kanara Northern Division.—The appeal filed by Government against the decree of Rs. 506-12-0 awarded in favour of the plaintiff Mr. Isloor, was decided by the District Judge, Dharwar, who reversed the decree of the Lower Court and dismissed the plaintiff's suit with costs.

Kanara Eastern Division.—An appeal as sanctioned by Government has been filed in the District Court, Karwar, against the decision of the Sub-Judge, Karwar, in the Civil Suit filed by Mr. A. R. Yellapurkar against Government. It is still pending.

A fresh suit has been filed by Mr. G. G. Khanolkar against Government claiming Rs. 2,000 as damages for breach of an alleged contract entered into by the Divisional Forest Officer, E. D. Kanara, in connection with

supply of teak slabs. The defence of the suit is sanctioned by Government.

Kanara Southern Division.—Out of the 5 pending appeals referred to last year 3 were decided—1 in favour of the Department and 2 against it. The remaining 2 appeals by the Department are still pending in the High Court.

Belgaum Division.—Out of the 2 suits pending from last year, 1 filed by Rao Saheb R. N. Kini was decided in his favour but an appeal has been filed by the Department and is pending. The other suit was decided in favour of Government shortly after the close of the year.

Shikarpur Division (Sind Circle).—The Civil suit filed by a coupe contractor last year against the Department is still pending.

Land Revenue Administration.

The revenue administration of the 4 forest mahals, viz. Bapgaon, Saiwan, Sawa and Wavar was retransferred to the Revenue Department with effect from 1st December 1931 as the combination of revenue administration duties with those of Forest Officers was in the case of these mahals, quite incompatible with the efficient performance of the latters legitimate duties.

The Divisional Forest Officer, West Nasik, continued to function as Assistant Collector and Excise Superintendent of Peint taluka. The Divisional Forest Officer, Surat, continued to be *ex-officio* Assistant Political Agent, Dangs.

The Excise and Revenue Administration of the Akrani Mahal was managed as usual by the Forest Department.

The Raisingpur Estate continued to be managed by the Forest Department under the Court of Wards.

The Revenue management by the Forest Department of the seven villages in the East Khandesh Division was satisfactory.

The three Forest Mahals of Dandeli, Kulgi and Virnoli in Kanara N. D. and two Mahals of Bilki and Kirwatti in Kanara E. D. continued to be under the administration of the Forest Department. The villagers appeared contented and their relations with the Department continued to be satisfactory.

Kumries.—In the Belgaum Division a majority of the villages were visited by the Divisional Forest Officer. The discontent prevailing in two villages owing to insufficiency of land was removed by a grant of additional area of 250 acres and by the transfer of some area from one village to another.

Village Panchayats.—There are at present 17 panchayats in the Southern Circle. No new panchayats were established during the year. Excepting the two panchayats at Chitrige and Halkar where some clearing and planting work was carried out, none showed any activities.

CHAPTER VIII.

GENERAL REMARKS.

Financially the year under review was better than its predecessor though the total receipts were considerably less than those of a pre-1930 average year. The continuance of trade depression accentuated by political unrest prevented the realization of normal revenues. Although in some divisions higher prices were obtained for the better class coupes, prices for timber at the sale depots both in the Northern and Southern Circles did not show any improvement. Moreover the demand for timber was less, causing heavy accumulations of stocks in the Dangs, Dandeli and Hattikeri Depots. The sandalwood market showed a slight improvement but prices for fuel and charcoal were very dull, particularly in the Sind Circle, where, owing to shortage of money, private land-owners sold their trees for a nominal price and this extra supply increased by further supplies of cheap material thrown on the market from the Public Works Department clearings along the new canals, brought many forest contractors to the verge of bankruptcy.

It is gratifying to note that the West Nasik Division, which hitherto has been worked at a loss, has for the first time shown a surplus of Rs. 13,581 and it is expected that with the opening up of the Peint forests, where the improvement of communications is an urgent necessity, this surplus will steadily rise.

Economies.—In view of the urgent need for economy it has been decided to reduce 4 posts of Ranger (Rs. 80—5—125 grade) in the Northern Circle. 2 posts of Forester (Rs. 30—1—40 grade) were reduced in the same Circle, one being replaced by a temporary guard in the grade of Rs. 15—½—20. In Kanara E. D. it has been found possible to eliminate the Bhartnalli Range by distributing its area among other Ranges. In the Belgaum Division the old Patne Range was abolished and converted into 2 independent Rounds. As a result of these changes, a number of posts under the permanent and temporary establishments, costing about Rs. 1,370 per mensem, will be abolished.

Civil Disobedience Movement.—Although there was a recrudescence of the campaign in January of 1932, the trouble was nothing approaching the scale of the previous year and was confined chiefly to the coastal villages of Ankola in Kanara and to parts of the Belgaum and Dharwar-Bijapur divisions. Little damage was done and the offences were usually reported direct to the police. In Surat where the market is largely controlled by Gujarati *dalals* their influence was more marked by reluctance to purchase Government sawn material than in the sale of standing coupes. In consequence the Dangs depots became overstocked and the Sundha mill has been temporarily closed down.

Thana Gurcharans.—The Gurcharan officer inspected the gurcharan lands in Mokhada, Bassein and Palghar and completed the work of selecting areas for modified clear fellings. He also collected the necessary

data for preparing a working plan for the areas so selected. As Forest Settlement Officer he held enquiry under section 7 of the Indian Forest Act in 31 villages of Bhiwandi, Bassein and Shahapur talukas where certain gurcharans have been selected for conversion into reserved forest, the area dealt with being 2,523 acres. He secured in several cases the support of the villagers in regard to conservancy and closure to grazing in the areas which will be felled under the system of modified clear fellings.

Khairanpatti forests.—The tree growth on the areas to be handed over to the Revenue Department in accordance with G. R., R. D., No. 43/28, dated 24th July 1931, was sold for Rs. 5,050 and the clearing of the trees is in progress. The transfer of the areas will be effected as soon as the clearing work is completed.

Forest Advisory Committees.—In the Northern Circle, 2 meetings were held in the Panch Mahals, 2 in Nasik and 2 in Thana. The question regarding the revival of the *tahal* campaign was discussed at the first meeting in Thana and the proposals made by the Gurcharan Officer, Thana, were accepted. A proposal was made at the second meeting held in Nasik that passes should not be given to professional graziers until the demand of all agricultural cattle had been met. This will be discussed again at the next meeting by which time further particulars will be available.

In the Central Circle the Committee held two sittings in each of the three districts, viz. East and West Khandesh and Kolaba. No subjects of importance were discussed. In the Kolaba Division a member of the Committee (Mr. S. V. Tilak) published and circulated at his own cost a Marathi pamphlet elucidating grazing rules and forest privileges enjoyed by the villagers and wild tribes of the Division.

In the Southern Circle four meetings were held, two in Kanara and two in Dharwar. In the Kanara meetings no matters of interest were raised. Several small points of local interest were discussed at the meetings held in Dharwar and grievances removed wherever possible.

Forest Cultivation and Forest Settlements.—A sum of Rs. 24,324 was realized as assessment for forest areas given out for cultivation in the Northern Circle. The general condition of the settlements was satisfactory.

One new settlement was opened at Tulja in the North Khandesh Division and the old settlements at Umarda, Wakwad and Mohida were extended in order to provide more economic holdings. In all three Khandesh Divisions the crops raised by the settlers were considerably damaged by late rains. No remission of assessment was however considered necessary. The settlers were given Takavi advances amounting to Rs. 8,955.

Alnavar-Dandeli Railway.—The revenue and expenditure of this Railway for the two years 1931-32 and 1930-31 compare as follows :—

Year	Receipts	Expenditure	Surplus or deficit
	Rs.	Rs.	Rs.
1931-32	40,848	44,489	—3,641
1930-31	43,069	43,835	— 766
Difference ..	—2,221	+ 654	—2,875

The working shows a loss of Rs. 3,641 against Rs. 766 in the previous year. There was a drop in goods traffic as indents for sawn material were curtailed by the M. & S. M. Railway. Although the railway as such shows a small loss it is of great value to the Department in reducing the cost of transport to the main line and in opening up fresh sources of revenue.

Grass storage under the 9-year monopoly contract.—The grass stored at Palghar, which was sold last year at Rs. 7-9-0 per 1,000 lbs. for 30 lakhs lbs. and at Rs. 8-3-0 for 81½ lakhs lbs., was all paid for and removed by the purchasers, the revenue realized being Rs. 86,360. The empty sheds are rented to grass and charcoal merchants pending disposal.

The grass stored at Godhra, with the exception of damaged grass which was sold for a lump sum, was sold at Rs. 5-8-0 per 1,000 lbs. The purchaser paid for and removed only 36,50,000 lbs., the quantity still to be removed being 85,89,500 lbs. According to the agreement he has to complete payment and removal by 31st October 1932.

No reasonable offer was received for grass stored at Dohad. After the close of the year, however, 58,99,240 lbs. of the oldest grass have been sold at Rs. 4-1-0 per 1,000 lbs. Though the grass was in fairly good condition a better price could not be obtained. The quantity remaining to be disposed of amounts to 38,35,850 lbs. The sale of this grass, which is well-stored and in very good condition has been held up in anticipation of a more favourable market.

Match Factories.—The Gujerath Islam Match Manufacturing Company, Ahmedabad, removed 158 cartloads of matchwood at the concession rate of 6 annas per cartload. According to Government Resolution, Revenue Department, No. 4596/24, dated 4th September 1931, the concession granted to this company for the removal of matchwoods from the Dangs was suspended as the terms of the concession were violated. The concession was, however, subsequently renewed as ordered in Government Resolution, Revenue Department, No. 4596/24, dated 3rd May 1932. No matchwood coupes were sold in the North and West Thana divisions owing to want of demand.

The Criminal Tribes Settlement at Dandeli was abolished from 1st November 1931 as per Government Resolution, Home Department,

No. 9758/2, dated 3rd November 1931. The dispensary has been retained under the control of the Forest Department.

Preliminary steps were taken with a view to the formation of irrigated plantations in Sind, and 10,000 acres of inland forest in Larkana division, which are to receive an assured supply of water were examined, and variations of soil and the depth of the sub-soil water were recorded. According to the working scheme, which is now before Government, it is proposed during the first 5 years, to concentrate on levelling the land and improving the *kalar* areas. These objects will be achieved by giving out the lands for temporary cultivation, which will bring in considerable revenue and reduce the cost of formation during the preparatory period. Regular planting will begin in the sixth year and be completed in 20 years time, 500 acres being taken up each year.

The question of the supply of surplus water from the Barrage Canals for forests is receiving attention and it is hoped that funds will be provided for the construction of sluices etc., in order that the best possible distribution of the water may be effected.

Remarks of Divisional Commissioners on Circle Reports are printed below :—

Commissioner, Northern Division (Mr. J. Monteath, I.C.S.).

"The working plan drawn up by the Gurcharan Officer, Thana, for the Protected Forests in charge of the Forest Department and Nominal Reserves was approved by the Commissioner and forwarded to the Chief Conservator under this office endorsement No. F.O.R. 205, dated 27th August 1932.

"2. The total number of forest offences increased from 6,349 to 7,446. The increase is marked under all the heads except under fires. The patrolling by the forest subordinates for detection of offences, deliberate grazing of cattle in closed area and stricter application of transit rules are the chief causes to which the increase in the number of offences detected can be attributed. In 1,350 cases the offenders could not be detected and in 141 cases they were let off with a warning while 5,715 cases were compounded recovering Rs. 32,311 as compensation in 5,574 cases. 124 new cases were taken to the court and 135 cases including 49 pending cases of the previous year were decided of which 119 ended in convictions. The number of fires decreased from 800 to 665, the chief causes of decrease being warnings issued to the villagers in the Panch Mahals and Surat districts by the Collectors, late rains, co-operation of the villagers in putting out fires and ebb in the tide of political movement.

"Rewards amounting to Rs. 493-14-0 were given to Patels for conspicuous help in forest protection in the Dangs.

"3. Grazing fees amounted to Rs. 80,194 as against Rs. 77,097 in the previous year, the increase being attributed to the admission of larger number of outside cattle in the East Nasik Division.

"The number of cattle impounded was 37,178 as against 39,529 in 1930-31. This decrease is shared by all the divisions except West Thana and is attributable chiefly to the fact that there were no cases during the year, of deliberate grazing of large herds without payment of grazing fees or of grazing in closed areas.

"4. The total revenue from the working of the forests rose from Rs. 13,91,513 to Rs. 19,51,510, i.e. by Rs. 5,59,997 while the expenditure fell from Rs. 11,24,149 to Rs. 9,89,203, i.e. by Rs. 1,34,946. The net increase in revenue amounted to Rs. 6,94,943 during the year. In this connection the Conservator remarks that though there is an increase in the revenue on the whole which is mainly due to the sale of coupes which could not be disposed of last year on account of the Civil Disobedience Movement, the revenue realised is much below the normal and this is due to the general trade depression. These remarks are borne out by the Collector of Thana.

"5. The expenditure on 'communications and buildings' under '52-A—Capital Outlay' decreased from Rs. 97,904 to Rs. 33,930 during the year under report.

"6. There was no progress made in the construction of the Temba-Parali section of the Kharadi-Parali Road though it is a matter of urgent necessity.

"7. The 4 Forest Mahals in Thana were re-transferred to the Revenue Department with effect from 1st December 1931.

"The year on the whole was peaceful and prosperous and the relations between the Forest and other Government Departments continued to be cordial."

Commissioner, Southern Division (Mr. A. W. W. Mackie, C.I.E., I.C.S.).

Kolaba Division.

"The year's report though uneventful is a healthy record of forest administration and indicates that the relations between the people and the Forest Department have been normal.

"The financial results as compared with those of last year show that the revenue increased from Rs. 1,29,933 to Rs. 1,57,503 while the expenditure decreased from Rs. 1,40,060 to Rs. 1,26,389 resulting in a net surplus of Rs. 31,114. The increase in revenue was due to an improvement in the timber market which enabled satisfactory prices to be obtained for coupes and to the fact that the last year's revenue was affected by the Civil Disobedience Movement. The decrease in expenditure is attributed to the 10 per cent. cut in salaries effected during part of the year, to the reduction of permanent travelling allowance of officers and to economy otherwise observed on account of financial stringency.

"The total number of offences during the year was 1,611 as against 1,603 for the previous year or an increase of 8 offences. Cases of detected unauthorised fellings increased by 46 and these are put down to greater

vigilance displayed by the subordinate staff. Cases of 'other offences' rose by 31 and these were violations of transit rules. These increases were however counterbalanced by decreases of 35 offences under 'Injury by fire' and 34 offences of 'unauthorized grazing'.

"The Collector considers that cases of wilful disregard of rules should be met by communal punishments. Such punishments for illicit cuttings had been hitherto suspended, but they have not been revived in G. R., R. D., No. 8654/24, dated the 29th July 1932.

"The number of cattle admitted to grazing was 77,599 as against 68,808 last year.

"Casuarina plantations at Akshi and Nagaon on the sea coast are being damaged by erosion year by year; an area of 1½ acres was washed away and 262 trees were damaged during 1931-32. The Collector suggests that if these plantations are to be saved from further damage some means should be devised for their protection in consultation with experts.

"Cultivation of clear felled areas with nagli and wari was undertaken in 46 coupes as against 39 last year. It is gratifying to observe that more people are gradually taking a liking for this form of cultivation in almost all Ranges except Pen and Karjat where the people have enough cultivable land and other means of livelihood.

"The net revenue of Matheran forests has been assigned to the Hill Station Municipality, but as the expenditure during 1931-32 exceeded the revenue the Municipality was asked to pay up the deficit. That body therefore represented to Government that the original object of affording financial help to the Municipality by allocation of the forest revenue would be frustrated if they were required to make good any loss in a deficit year and proposed that such deficit should be adjusted against the profits in the succeeding years. Government have approved the Municipality's proposal in their resolution No. 2094/28, dated the 19th August 1932, R. D.

"The appeal preferred by Sardar Biwalkar in the High Court in respect of a forest area of 1,713 acres is still pending.

"Two meetings were held by the Forest Advisory Committee but no subjects of importance were discussed. The Collector suggests that the present composition of the Committee may be altered by replacing the President, District Local Board and the M.L.C. of the District by elected representatives of the District Local Board. The Commissioner does not think it is advisable for Government to institute any change until the desirability thereof has made itself more felt than at present.

"The administration was generally satisfactory and the relations between the Revenue Department and the Forest Department continued to be cordial."

Commissioner, Southern Division (Mr. A. W. W. Mackie, C.I.E., I.C.S.)

Southern Circle.

"The year under report was not satisfactory in financial results. The total revenue was Rs. 23,39,931 as against Rs. 23,72,805 last year and the expenditure was Rs. 17,98,891 as against Rs. 17,90,995 in the previous year. The net result was that the surplus declined from Rs. 5,81,810 to Rs. 5,41,040. The decrease in revenue occurred mainly in Kanara, N. D., Belgaum and Dharwar-Bijapur divisions. The surplus in the Kanara, N. D., alone fell by over 2 lakhs for want of demand for timber in the Dandeli depot. The fall in the remaining two divisions is set down to trade depression and consequent low prices realised for coupes. The decrease was however for the most part counterbalanced by increases in the remaining three divisions, viz: Kanara, Eastern Division, Southern Division and Western Division. In Kanara, Southern Division, the revenue did not come up to expectation as the auctions at the Hattikeri Depot in March were affected by congress boycott and timber worth a lakh of rupees remained unsold.

"Two Forest offences during the year numbered 3,236 as against 2,763 in 1930-31. The increase occurred in unauthorised fellings, illicit grazing and other offences, cases of forest fires however showed a decrease.

"Although the number of forest fires in the Circle fell by 88 the offences in the Dharwar-Bijapur division were 40 in excess of the last year's figure and the Divisional Forest Officer attributes the increase to the after-effects of congress activities. The increase in unauthorised fellings is principally shared by Kanara, S. D., and Belgaum. In the former it is ascribed to better detection work while in the latter it is said to be due to the general economic depression and the after effects of the Civil Disobedience movement.

"The increase in the number of unauthorised grazing and other offences occurred mainly in Belgaum and Dharwar-Bijapur divisions, and is attributed to economic causes. Violations of transit rules and abuse of the exemption from grazing fees granted to stall-fed cattle in Bijapur were largely responsible for the increase.

"3. The number of cattle impounded for illicit grazing rose from 10,951 to 15,707. The increase was shared by all divisions of the Circle except Kanara, E. D. The number of cattle admitted to grazing rose by 66,171. It was 4,49,953 during the year as against 3,83,782 in 1930-31.

"Out of 442 cases of forest fires all but six remained undetected.

"4. The working of the Alnavar-Dandeli railway resulted in a net loss of Rs. 3,641 during the year as against Rs. 766 in the previous year. While the revenue declined from Rs. 43,069 to Rs. 40,848 the expenditure increased from Rs. 43,835 to Rs. 44,489. The decline in earnings is attributed to less export of indent material of the M. & S. M. Railway.

"5. Attempts at forest Satyagraha were staged in parts of Belgaum, Bijapur and Kanara districts but prompt and vigorous action by the Police prevented their assuming serious proportions. A notable feature of these attempts was that while the campaigns launched in 1930 were sustained by local villagers this year's attempts were started entirely by congress hirelings and died away with their arrest.

"6. The revenue administration of the five forest mahals in Kanara was satisfactory. One of these, viz. Bilki Mahal, has recently been retransferred to the Revenue Department (G. R., R. D., No. 9348/28, dated 8th August 1932).

"7. The relations between the Revenue Department and the Forest Department were cordial throughout."

Commissioner, Central Division (Mr. H. B. Clayton, C.I.E., I.C.S.) :—

* * * *

"5. The total number of offences during the year under report was 8,798 as against 7,982 in the previous year. There was thus an increase of 816 offences to which all the districts except West Khandesh contributed. This increase was mainly in respect of offences falling under the heads 'Injury by fire' and 'Unauthorised felling', there being an appreciable decrease in the total number of offences under the head 'Unauthorised grazing'. The divergences from normal are in no case excessive and are probably due to better registration than was possible in the previous year.

"(*a*) *Injury by fire.*—Although there is a total increase under this head of only 30 offences for the whole division as compared with the last year's total there is an abnormal rise in the number of offences in the East Khandesh Division, viz. 77. This increase is however counterbalanced by the decrease in other forest divisions like West Nasik and Satara. I know of no explanation for the increase in East Khandesh. There is certainly no local feeling against the Forest Department in the forest areas of that district.

"(*b*) *Unauthorised felling.*—There is an increase of 1,082 offences under this head, including a serious increase of 434 offences in the Satara Division. The Divisional Forest Officer, Satara, reports that this increase is due to the fact that the villages in his Division being thickly populated the villagers seek opportunities to remove stealthily fuel from Reserved forest which is their only source of fuel supply.

This, however, does not account for the specially large increase in the Satara District as the economic conditions were similar everywhere and I incline to attribute the increase in Satara to more close supervision.

"(*c*) *Unauthorised grazing.*—There is a total decrease of 314 offences under this head chiefly due to the abundance of fodder outside reserved forest on account of good rains. Only the Poona Division shows an

increase of 37 offences. This is mainly due to cattle trespass in some kurans which remained unsold as a result of forest Satyagraha.

"(*d*) *Prosecutions.*—It is satisfactory to note that in the Central Circle out of the total number of 247 cases 209 were disposed of and 193 ended in conviction. Apart from this 7,719 cases were compounded and brought in compensation amounting to Rs. 62,970.

Protection from fire.

" 6. The total area burnt in this division during the fire season ending 31st May 1932 was 335 square miles as against 364 square miles in the previous year. Though there was a reduction in the total area burnt during the year there was an increase of 84 square miles in East Khandesh chiefly due to carelessness of villagers and travellers passing through the Forests Big fires occurred in the North and East Khandesh Divisions on account of the heavy growth of grass. With reference to the remarks of the Conservator of Forests, Central Circle, in paragraph 27 of his report regarding the revival of the system of communal punishment it may be pointed out that Government, in their Resolution No. 8654/24, Revenue Department, dated 29th July 1932, have recently passed orders in the matter.

Grazing fees.

" 7. The decrease of Rs. 22,521 in the Central Circle is reported to be due to the fact that the villagers took a lesson from the last year and paid their grazing fees in time at the normal rate with the result that the number of cattle paying double fees decreased. In the North Khandesh Division the decrease is attributed to the fact that the number of cattle brought in by professional graziers was much less than usual

General.

" 8. (*a*) It is gratifying to note that the West Nasik Division which was hitherto working at a loss has for the first time shown a surplus of Rs. 13,581. I endorse the Conservator's remarks that the improvement of communications for the opening up of the Peint forests and through outlets to the coast and the Baroda Railway is an urgent necessity.

(*b*) The very mild recrudescence of forest Satyagraha in the Satara Division was nipped in the bud by the prompt arrest and imprisonment of the Satyagrahis. I support the Collector of Satara's suggestion that now is the time to consolidate the improvement in the popular attitude by the dissemination of easily intelligible information regarding the benefits to be derived from forest conservancy."

P. E. AITCHISON,

Chief Conservator of Forests,
Bombay Presidency

Poona, 10th October 1932.

Report.

Forest Department.

Administration — of, in Bombay Presidency, including Sind, for 1931–32.

GOVERNMENT OF BOMBAY.

REVENUE DEPARTMENT.

Resolution No. P 57/193.

Bombay Castle, 31st January 1933.

Letter from the Chief Conservator of Forests (Mr. P. E. Aitchison), No. 2/1649, dated the 10th October 1932—Submitting the Forest Administration Report of the Bombay Presidency, including Sind, for the year 1931–32.

RESOLUTION.—In their review on the working of the Forest Department for the year 1930–31 Government observed that the revenue for that year was the lowest during the last decade. They are glad to notice that during the year under report there has been, speaking of the Presidency as a whole, a substantial improvement. The following figures illustrate the financial results of the year as compared with the the 1930 31 and the average for the years 1920-21 to 1929–30.

Year	Gross income	Expenditure	Surplus
	Rs.	Rs.	Rs.
1931–32	56,74,000	40,67,000	16,07,000
1930–31	52,24,000	42,45,000	9,79,000
1920 21 to 1929–30 ..	72,95,000	43,21,000	29,74,000

As the reduction in expenditure during 1931–32 was due to the emergency cut in pay and to the postponement of works the real improvement compared with the previous year is about Rs. 4,50,000. This was due to the sale in the Northern Circle of coupes which remained unsold in 1930 31 on account of political unrest, and also to better prices in the Central Circle. The increase in these circles was partly counterbalanced by a decrease in the Southern and Sind circles where trade continued to be bad and stocks accumulated.

2. On account of financial stringency Government had to curtail grants so as to limit expenditure only to urgent works. The expenditure on roads and bridges was Rs. 1,34,000 as compared with Rs. 2,28,000 during 1930–31 and that on buildings Rs. 29,000 as against Rs. 54,000. The expenditure on conservancy and regeneration was Rs. 1,22,000 as against Rs. 1,40,000 Nevertheless there was satisfactory progress in all silvicultural operations.

3. The number of offences registered during the year was 22,987 as against 20,294 during 1930–31. This increase does not indicate any real increase in crime; it is rather the result of better registration. The year was noticeable for the absence of mass offences against the forest law which were such an ugly feature of 1930–31.

4. The value of major and minor produce removed by purchasers amounted to Rs. 24,05,000 and Rs. 9,36,000, respectively, as against Rs. 19,38,000 and Rs. 9,40,000 during 1930–31. Major and minor produce removed by concessionists and free grantees amounted to Rs. 12,11,000 against Rs. 11,71,000.

5. The number of cattle admitted to grazing was 23,27,000 of which 6,09,000 were admitted free, the corresponding numbers for the previous year being 21,51,000 and 6,14,000, respectively. The collection of grazing fees fell from Rs. 4,93,000 to Rs. 4,83,000. The decrease, for which the Central Circle is responsible, was due to the fact that in 1930–31 grazing fees were not paid in time as a result of political agitation and were subsequently recovered at double the usual rates.

6. The department had to work in unfavourable conditions due to the continued depression in timber trade and the financial stringency of Government. Nevertheless there was a substantial improvement in revenue without a curtailment of the forest privileges enjoyed by the large mass of rural population. For this result Government desire to acknowledge their thanks to Mr. Aitchison and to the officers working under him.

By order of the Government of Bombay
(Transferred Departments),

H. V. R. IENGAR,
Under Secretary to Government.

To

The Commissioner in Sind,
The Commissioners of Divisions,
All Collectors, including the Deputy Commissioner, Upper Sind Frontier,
The Chief Conservator of Forests,
All Conservators of Forests,
The Senior Superintendent of Land Records, C. D.,
The Director of Agriculture,
The Accountant General,
The Director of Industries,
The Compiler, General Administration Report,
The Director of Information and Labour Intelligence,
The Oriental Translator to Government,
The General Department,
The Finance Department,
The Public Works Department,
The Secretary to the High Commissioner for India, London (by letter).

BOMBAY : PRINTED AT THE GOVERNMENT CENTRAL PRESS.